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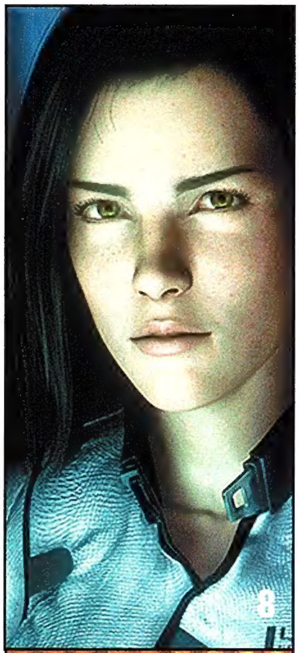

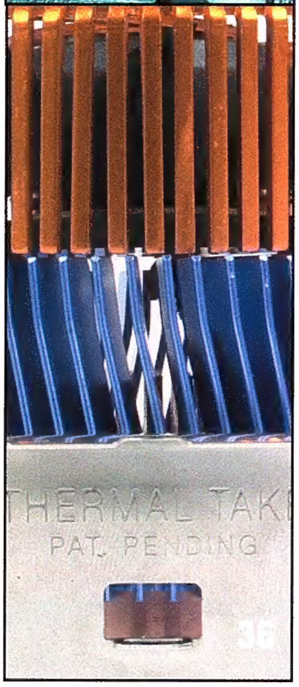

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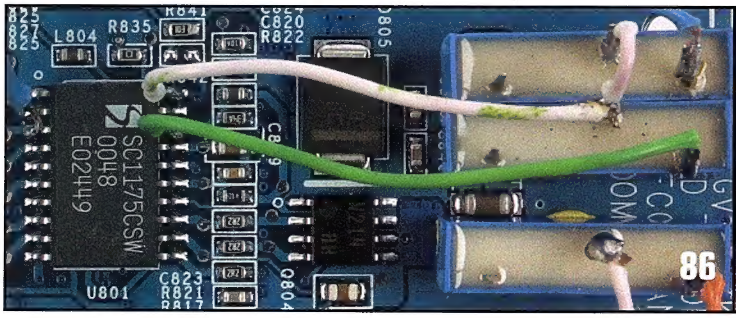

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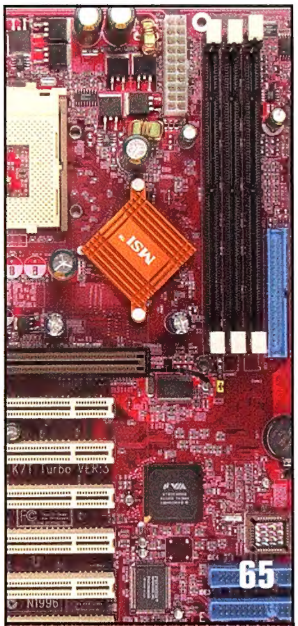

SUBSCRIPTIONS 30/84

If you subscribe this month, we guarantee you'll have the most super-lucky-special month ever. In the history of history itself. You'll also be in the running for the sexy flat panel Boston Acoustics speakers reviewed this month on page 63. By the way, that first bit was a totally and utterly unfulfillable promise. We may have free stuff to give away, but that doesn't mean we can control future events in our time/space continuum, or at least admit to the outside world that such technology is in our possession. In fact, forget all about our ability to manipulate the laws of physics and subscribe to atomic instead.

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Once again we've got plenty of free stuff to throw your way. Six signed limited edition Summoner posters, five *Gorillaz* CDs and one huge hunk of copper are up for grabs.

HEAVY METAL

In the old days, you could hold a full-length ISA card real close to your face and move it slowly past your eyes and it was like flying over a city of the future. The Sound Blaster AWE 32 was excellent for this purpose. Apart from a full-length card with chunky capacitors and SIMM slots, the heatsink fan was the second coolest looking bit in a PC. With the demise of primitive IC technology, the HSF has moved up to centre stage. These beautiful, sculptured objects have always been cool in more ways than one.

Sometime in the last couple of years, HSF makers, with their delightfully misspelt packaging labels and funny company names, got seriously experimental. The Attack of the Orbs signalled the shift. Initially the Orbs were a semi-scientific clone of the legendary Hewlett-Packard Arctic Cool, which was designed using actual real thermo-science, and was demonstrably better at dissipating heat than a boring old finned block. Then the Orbs grew bigger, upwards and outwards. Finally, in one of the most impactful catalysts for the mod scene, they started appearing in multiple colours.

And who needs one boring old fan when two contra-rotating spinners are begging to sit on your chip? And who wants aluminium? That's for gutters and dinghies. We want super-high-tech copper, we do. kilos of the stuff. We don't need no stinky fancy pants slab of peltier or insultingly low-tech water – we want sculptures of anodised, radiating, multi-spinning art. And we're pissed that we can only fit a few in our case.

Being a long-time fan of bright, shiny objects, I've always dug a nice heatsink, but it's all starting to look like there's suspiciously little science behind the rapidly morphing shape of these lumps. To the Labs! After churning through a good 10kg of copper and aluminium and sacrificing a few grams of silicon and ceramic, we can all now be sure – for the moment at least – of which lump is right for our box.

Nothing complements a PC's centrepiece heatsink sculpture like a handmade GeForce3 Ultra. It's high art meets high science meets Mad Max. It's pure atomic too. We're an old-fashioned arts and crafts kinda mag, for the Nano Age. If we can't buy something we need, by crikey we'll make it. This project was inspired by a bunch of crazy Russians who helped us along the way. As an aside, we all think a little more kindly of Telstra after experiencing the Russian PSTN.

See you in four weeks!

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atomic
MAXIMUM POWER COMPUTING

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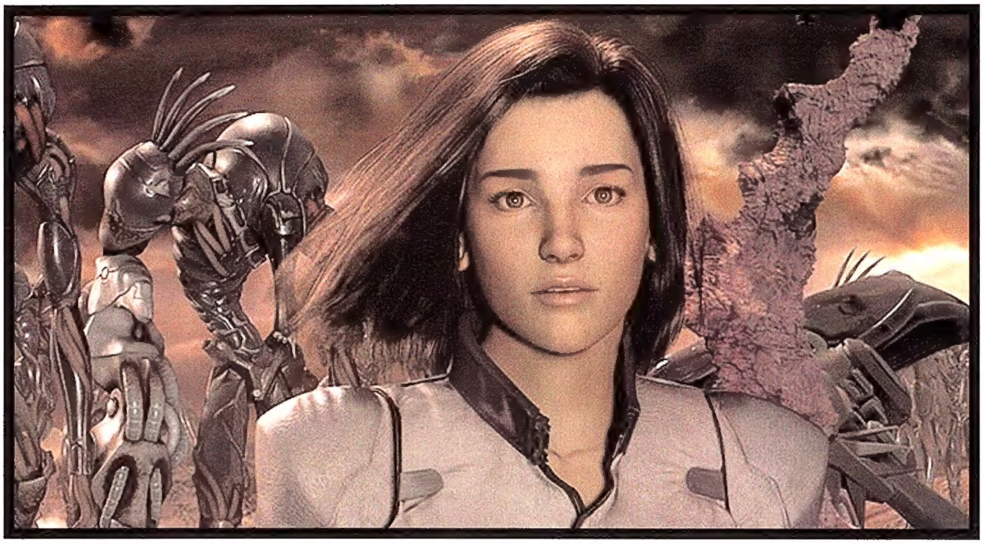
Short Circuits

On 23 July, Blizzard Entertainment announced that its much anticipated real-time strategy game Warcraft 3: Reign of Chaos will not be released as planned. It was originally scheduled to be released ready for Christmas, but has now been delayed until some time in (hopefully early) 2002. The reason given for the delay is that Blizzard doesn't want to release an 'inferior' product, and will only release it when it's 'ready'. Blizzard suggests that the additional development time will prove 'invaluable' in improving and optimising the game. Let's hope it pays off.

The release date for Windows XP, Microsoft's latest incarnation of the Windows OS, is fast approaching. But it may not come out on schedule. Several privacy groups in the US have asked the Federal Trade Commission (FTC) to prevent the release of the OS. They have alleged Microsoft is guilty of unfair and deceptive trade practices. Executive Director of the Electronic Privacy Information Center (EPIC), Marc Rotenberg, is spearheading the complaints. He said during a press conference that the complaint '. . . concerns the privacy implications of the Windows XP system that is expected to become the primary means of access for consumers to the Internet'. He has also asked the FTC to investigate the intent of Microsoft to '. . . collect, track and profile millions of Internet users'. The Passport software is basically an 'eWallet' that will store personal details about computer users. It is used in a limited form for many Microsoft Web sites, including Hotmail. Passport is integrated into Windows XP, and is the centre of the privacy concerns.

A real fantasy

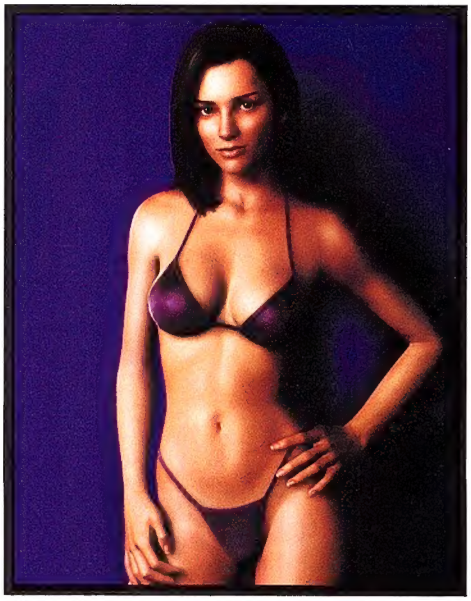


For four years, over 200 artists, animators, and programmers have been locked away in the top four floors of an office building in Honolulu, with nothing more than coke, pizza and bean bags. So what did they do in all this time? They didn't build the world's largest tower of coke cans, but they did develop a movie – *Final Fantasy: The Spirits Within.*

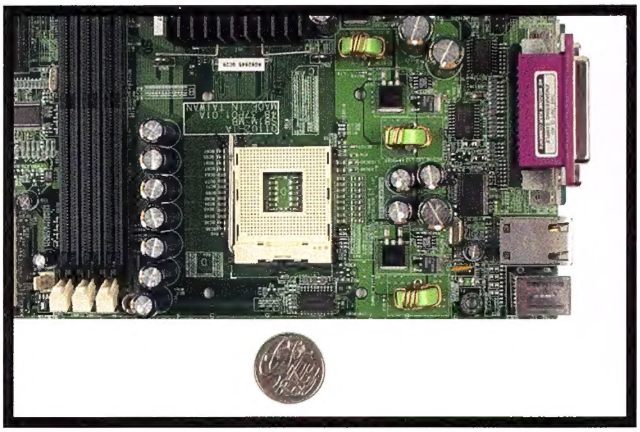
The film is directed by Hironobu Sakaguchi, the genius behind the Final Fantasy game series, and is slated as the first 'HyperReal', 100% computer-generated feature film. In order to produce the film within a reasonable time frame, Square USA called in the big guns. Initially, Square USA purchased 40 new Silicon Graphics Octane workstations. When it found out that wasn't enough, it ran out and bought a truck load of SGI Origin 200 servers (newly released at the time). Over the four years of the film's development, Square USA added a further four Silicon Graphics Onyx2 systems and another 127 Octane workstations to its arsenal!

The Octane workstations run a single or dual 400MHz, MIPS RISC-based, 64-bit R12000A CPU with 2MB of L2 cache. The memory capacity can range from 256MB to 8GB of SDRAM. The I/O bandwidth of the systems is a whopping 1.6GB/s per port. Up to 128MB of memory is available to the Advanced VPro graphics architecture with up to 104MB for textures. With hardware-accelerated OpenGL, 48-bit RGBA colour and a 96-bit accumulation buffer, these things rock! Oh yeah, and they took up only about three floors of an office building.

The animation process for the film was done in three stages. In the first stage, the layout and basic renderings of the scenes were constructed as three-dimensional storyboards. Principle animation was done at the second stage, based on data gathered from motion capture. In the final stage of the process texture artists apply the skin, hair and other features to characters and props. Speaking of hair, the main character from the film, Aki, has 60,000 strands of hair, which alone took up about 20% of production time. An average scene from *Final Fantasy* contains a depth complexity of nine layers; Quake 3 has about a depth complexity of less than three. But for the most complex scene, a nuclear explosion, there's a whopping 486 layers. Makes you wonder if a KYRO would cope with the overdraw?



Tingling with anticipation



This month has been the calm before several impending hardware storms. In the lead-up to Christmas there are several important new pieces of hardware that are set to bombard our senses. This includes major CPU releases from AMD and Intel, several new exciting motherboard chipsets and some potential surprises from the video hardware manufacturers.

Expect to finally see the long-awaited 478-pin Pentium 4 processors, AMD's desktop Palomino, VIA's highly anticipated Pentium 4 DDR chipset, Intel's long-awaited i845 SDRAM chipset for the P4, NVIDIA's reworked nForce chipset for the Athlon and Duron, the successor to the Radeon from ATI, maybe a GeForce3 MX and potential surprise packages from Bitboys and Matrox.

At the moment everyone is tight-lipped about these developments; however, one i845 motherboard was mistakenly sent to us from Taiwan, despite an embargo on the boards set down by Intel. This means we're able to give you a first look at the remarkably small 478-pin socket that will be a common sight over the next year. One other remarkable thing: following on from the K6-style heat spreader on the Northbridge of the AMD 760 MP chipset, the i845 Northbridge resembles the FC-PGA packaging used in the Pentium 3. In next month's atomic we'll give you the lowdown on how the Tualatin Pentium 3 and the i845 P4 chipset perform. ○

The real smart shader

Never before has there been a version of DirectX as confusing as 8.0. For hardware manufacturers, DirectX 8.0 (DX8) requires compliance and compatibility. To be compatible, the card must have drivers for DX8, but to be compliant it has to support programmable Vertex and Pixel Shaders. To complicate things, there are two levels of compliance for the Pixel Shaders and three levels for Vertex Shaders. And this is all before ATI's announcement of Smartshader technology, touted to support DirectX 8.1 with the new Pixel Shader 1.4 standard.

Smartshader is an evolutionary step up the ladder of DX8. After the initial announcement of DX8, John Carmack commented that the Pixel Shaders in DX8 were rather inflexible and the standard did not expose their true potential. In fact, the GeForce3 has more features than those specified in Pixel Shader 1.1, and these features could only be exposed through custom OpenGL extensions, giving developers one more reason to use OpenGL in favour of DX8.

ATI's Smartshader fully supports the new Pixel Shader 1.4 format, seen by many as what DX8 should have been in the first place. ATI's upcoming R200 will be the first chip to use this technology. Smartshader is DirectX 8.1/Pixel Shader 1.4 compliant, adds support for six textures in a single pass and supports up to 22 instructions per set in comparison to 12 instructions in DX8. Some of the possible new effects include anisotropic lighting, procedural textures and the Holy Grail of shading – True Phong Shading.

NVIDIA was quick to respond to ATI's announcement as it defended its GeForce3 line. NVIDIA claims that it can perform similar functions and that the GeForce3 is also DirectX 8.1 compliant. But it soon became apparent that the GeForce3 is only Pixel Shader 1.3 compliant and not up to the new 1.4 standard unveiled by Microsoft. One of the main reasons for this is that the GeForce3 supports only four textures in a single pass, but to be Pixel Shader 1.4 compliant the hardware needs to support six textures, which the R200 is now known to be able to do. It's clear that ATI's announcement of Truform and Smartshader is designed to pave the way for the release of the next-gen Radeon, slated to hit the market in September. ○

Short Circuits

Both AMD and Intel have been working on the development of the 0.13-micron process for use in their new processors. Intel has announced that it plans to launch a 0.13-micron-based Celeron clocking in at 1.2GHz in the fourth quarter. Intel began development of the 0.13-micron process technology-based product under its Tualatin project mid-last year. With 0.13-micron processing, yield is 40% higher than that of 0.18-micron processing. AMD is not expected to develop a product based on this technology until the third quarter of 2002, placing Intel in a prime position to snap up the budget market. Intel is also developing a mobile version of the chip to go head on against the mobile Palomino – 0.13 is the new battleground.

NVIDIA confidently claimed that due to its experience in the graphics field, it would have no problems developing an integrated mainboard chipset. However, it seems it may have been wrong. During the launch of the first Crush chipset, there were quite a few unanticipated 'issues'. MCP Southbridge yields were lower than expected, resulting in the chip costing more than planned. Reportedly, due to these problems, NVIDIA is working on a redesign for the Crush chipset and, due to the severity of the problems surrounding this issue, it was forced to alter some of the features. First up, the nForce220 may no longer contain Dolby Digital 5.1 sound, which means there would only be AC'97 audio. There is also the possibility of the network controller being removed. These developments have, of course, been strongly denied by NVIDIA.

Short Circuits

- The next big development on the origin of the sun could very well come thanks to Sun. No, you are not experiencing a glitch in the Matrix, rather the University of Durham in the UK has launched its Cosmology Machine, a supercomputer that is tasked with discovering the origin of the universe. Running via two main clusters – a 28-processor called SunFire and another that uses 128 UltraSPARC III processors – the Cosmology Machine has total of 112GB of RAM with 7 terabytes of storage.

- Just as the creators of the legendary Back Orifice, Cult Of The Dead Cow have been working on 'Project X', software designed to facilitate the free flow of online information into countries with information restrictions, the reigning Taliban regime in Afghanistan have finally succeeded to do what Senator Alston has only dreamed of. They have banned the Internet. This joins a list of various modern evils that have been banned, including musical instruments, floppy disks, lipstick and television.

- In last month's atomic there were a couple of misprinted contact details for products reviewed. The correct details are: Rounded drive cables www.pccasegear.com; AOpen AX37 motherboard – (02) 9211 2919.

- The S-15V AG Neovo monitor that is for sale in Australia has slightly different specifications to what we reported last month. The monitor has a viewing angle of 160°, a maximum resolution of 1,024 x 768 at 70Hz and comes with S-Video and composite inputs alongside the captive D-sub cable of the base model.

Run for the hills

It is always amusing to see how the mainstream media deals with virus scares. Viruses and worms are still very much a mystery to most, and the accompanying intrigue of the unknown makes for good sensationalist news. The latest in the line of 'Oh my god, it's the end of the world as we know it' headlines has been due to the Code Red worm.

Code Red in its pure form has one mission: infect as many machines as possible and then start spamming 400MB chunks of garbled data to the Web site www.whitehouse.gov (not the much more popular pr0n site www.whitehouse.com). The worm went through this routine during July, infecting servers at an alarming rate, but was stopped when network administrators changed the White House's IP address.

Rather than make a concerted effort to stop it then, FBI and Microsoft officials waited until the day before it was due to resurface on 1 August before launching a remarkable scare campaign not seen since Y2K.

According to some pundits, such as the permanently paranoid Steven Gibson (www.grc.com), Code Red is a harbinger of destruction and is set to loiter around the Internet for all eternity due to a combination of 'mutations' and incorrectly set clocks on susceptible machines, which allow the worm to keep replicating through the period when it should be dormant. Since the White House stopped the ultimate objective of the worm, the major damage caused by the worm is a potential slowdown of the Net during the replication phase.

Making Max

It's done. After four years of hype, anticipation and heated debate over the recurring suggestion of vaporware, Max Payne struck gold on 15 July. Game conception began as early as 1996 as a third person, hard-core action game.

One of the main reasons why the game took four years to develop is that coding the engine ate up most of the first two years. Max Payne, being Remedy's second title, began with a lot of guesswork and consequently resulted in some levels being redesigned as the team grew and 3D technology advanced. For the realism factor and the bragging rights of photo realism, the Max team took a trip to New York in early '99 to photograph famous sites and key game locations. A lot of Max Payne's textures were actually digitised images of tiles, bricks and walls taken directly from New York. If you've been to New York, then playing Max should reveal that many key locations are very similar as particular care was taken to ensure maximum realism.

A problem with the manufacturer caused some delays shipping the game.The Remedy crew didn't get much of a holiday as they worked busily on the first patch, which rolled out on the 27th. Visit www.maxpayne.com for the latest patch, and be sure to check out our full review on page 74.

WHAT'S HOT	WHAT'S NOT
■ **i845** **Pentium 4 for all**	■ **Tualatin** **Why do we need a new Pentium 3?**
■ **Diablo II: LOD** **The expansion from hell**	■ **Half-Life: Blue Shift** **We are still wondering why . . .**
■ **Real puppies** **Fluffy, cute and loyal**	■ **Sony Robot Aibo** **$4,000 for a hunk of barking plastic**
■ **Aluminium HSFs** **Light and CPU friendly**	■ **Copper HSFs** **Heavy, core-crushing beasts**
■ **ATI** **Potentially Shadier than the others**	■ **NVIDIA** **Is the reign of terror almost over?**
■ **Mouse mats** **For the best in precision gaming**	■ **Doormats** **Way too rough for fragging**

SETI solved

The Search for Extra Technical Intelligence is over. The results are in and have been marked by our judging panel. The overall scores were remarkably high, with the majority of entrants getting over 40 answers correct. The winner of our search, Chris Whild aka Giess from Eaglehawk in Victoria, managed to score an astonishing 48.5 out of 50. For the effort, he's picked up an external Maxtor 40GB FireWire hard drive and FireWire adaptor card.

Thanks to everyone who entered. Here are the answers that you have been sweating over in the past months:

1. What does IDE stand for? Integrated Drive Electronics

2. How many pins does an SSI power connector have? 24 pins

3. On ribbon cables, what does the red line represent? Power/Pin 1

4. How wide is the data bus on a parallel port? 8-bit

5. When (year and month) did Creative release the Sound Blaster Live!? August 1998

6. What does BIOS stand for? basic input/output system

7. What does CMOS stand for? complementary metal-oxide semiconductor

8. What's a BSOD? Blue Screen of Death – the screen presented when Windows crashes

9. Which is executed first: autoexec.bat or config.sys? CONFIG.SYS

10. How many pins are there in an Ultra160 SCSI cable? 68 pins

11. What does the TCP in TCP/IP stand for? Transmission Control Protocol

12. What's the name of the 4-pin power plugs-in used for peripherals? Molex connector/plug/etc

13. What does RAID stand for? redundant array of inexpensive (or independent) disks/drives

14. How many kilobytes in a megabyte? 1,024KB

15. When was OpenGL first introduced? 1992

16. What did the EMM driver for DOS allow? Gave access to extended memory under DOS to play all those big games like Wing Commander!

17. What is the JEDEC? Joint Electron Device Engineering Council

18. What two types of bearings are used in heatsink/fans? Sleeve and Ball

19. What is the name of the CD-ROM technology in which the drive rotation slows in order to keep the read speed constant? Constant Linear Velocity

20. What does Moore's Law state? The brief answer is that processing power doubles every 18 months

21. What frequency does Bluetooth operate at? 2.4GHz

22. How many kilobytes does a double-sided 5.25in floppy store on a PC? 320KB for single density, 720KB for double density or 1.2MB for high density

23. What DOS command would you use to wipe/reset the boot record? FDISK /MBR

24. What FSB speed is DDR 2100 memory designed to work with? 133MHz (it runs at an effective 266MHz when double-pumped)

25. What does UDP stand for? User Datagram Protocol (it's TCP's brother)

26. What's the maximum size partition FAT16 supports? 2GB

27. What is port 23 the default port for? Telnet

28. What's the difference between co-operative and pre-emptive multitasking? The short version: co-operative multitasking OSes rely on the programs themselves to behave and give up the CPU in order for other processes to run. Pre-emptive OSes are more efficient and use a scheduler, which gives and takes processor time to and from running processes. The latter is the basis of all modern multitasking operating systems.

29. What speed does the AGP bus normally run at? 66MHz

30. What are Phase Change Thermal Interface Materials better known as? thermal tape/frag tape

31. What was the name of the first graphics chipset from NVIDIA, and what card did it power? The NV1, which powered the VRAM version of the Diamond EDGE 3D.

32. Which company developed SLI (Scan Line Interleave) technology for video cards? Quantum 3D developed the technology for its Voodoo1-based Obsidian cards.

33. Which judge presided over the 1992 court case between Intel and AMD over rights to the 386? Judge J. Barton Phelps

34. What is Ymodem? A popular, non-error correcting file transfer protocol used back in the BBS days. Couldn't be used on any connections past 14.4K, as line noise would screw up bytes.

35. What company designed the plug-and-play BIOS? Microsoft

36. What was the first Intel processor to use a clock multiplier? 486DX2/50 (introduced 3 March 1992)

37. Which model of Celeron processor is renowned for its extreme overclockability? Mendocino Celeron 300A

38. What do UTP and STP mean? Unshielded Twisted Pair and Shielded Twisted Pair

39. Who is credited as having invented the World Wide Web? Tim Berners-Lee.

40. How many official MP3 genres are there (according to the ID3 tag standards), and which genre comes last on the list alphabetically? 79/80 (the first genre is numbered 0) according to the official standards. The last on the list is Vocal.

41. Explain why a 20GB hard drive will only format to 18.6GB under FAT32? FAT32 uses 16KB cluster sizes for partitions over 12GB.

42. In networking terms, what does the command in-addr.arpa do? It is the command for a reverse DNS lookup.

43. Which company first discovered the High Memory Area loophole that allowed DOS to load itself into high memory? Quarterdeck. It realised a trick using the A20 address line to fool DOS into thinking it could access an extra 64KB of memory above the first 1MB, below this 1MB. Microsoft later licensed this for DOS. Some users may remember that the Quarterdeck HMA driver and QEMM, the Quarterdeck Extended Memory Manager, were around before HIMEM.SYS and EMM386.EXE

44. What chipset is made up by the northbridge/southbridge chips shown in image? VIA KT133A

45. What's the importance of Ring 0 in Intel CPUs? It's the most privileged execution level in the CPU. Any code running at Ring 0 has complete access to the system. This is why programs running at Ring 0 that crash bring down the whole system (as a side note, the Windows interface is purportedly run at Ring 0 – this causes the interface to be more responsive as it gets high priority in the CPU, but a crash causes a Blue Screen of Death).

46. When using video and system BIOS caching, where is the information cached? In the level-2 (L2) cache of the processor

47. Prior to the release of DOS 6.22 what was the largest supported hard disk size? 8.4GB

48. What does INT13 allow? Access to drives defined in the BIOS – that is, access to storage devices via the BIOS, without the need for a driver. This is how OSes can find and write to drives and access CD-ROMs during installation before installing IDE/SCSI drivers.

49. What disk operating system served as the basis for DOS? CP/M (version 2.2, to be exact)

50. What does the 'active' partition refer to? The system's BIOS will always look to the 'active' partition to boot. Only one partition can be marked as active, and it has to be a primary (but can reside on any drive).

The truth behind MP3s

Ashton Mills dispels the myth that the mp3 will signal the end of the music industry's ability to make massive profits

This year Channel [V], the popular cable music channel, ran an online survey to determine exactly what impact MP3s have had on music sales. For fear of losing their stranglehold grip on artists and distribution channels, the Recording Industry Association of America (RIAA) and its cohorts have been spreading FUD (fear, uncertainty and doubt) about MP3s and their impact on music and the music industry. They claim, as you're well aware, that MP3s have allowed piracy of music to occur on an epic scale, and that this is costing them millions in lost CD sales.

And no doubt they have lost CD sales to MP3s. Piracy is certainly happening, but are MP3s - and, more importantly, the freedom of choice that they allow - having the adverse affect on profits that many claim?

According to the Channel [V] survey, the answer is no. In the online survey 4,000 participants responded to questions about their music download habits over a six-week period. The more interesting results include:

- 78% of downloaders believe that downloading a track off the Net hadn't stopped them buying the single; 22% of downloaders believe it had.
- 86% believe that downloading tracks hadn't stopped them buying the album that featured those tracks; 14% believe that it had.
- 86% said they had purchased a CD album as a direct result of downloading one or more tracks off it and deciding it was good on that basis; 14% said they hadn't.
- 95% of downloaders said they would purchase tickets from an artist whose music they'd downloaded; 79% said they would purchase t-shirts or other merchandise from an artist whose music they'd downloaded.

These results confirm what you and I have always known - that MP3s are promoting sales. Despite the fact that there are users who are not buying music as a result of MP3s, there are a larger number of users who are buying music they wouldn't have otherwise bought due to MP3s. This shows that MP3s are in fact good business for the RIAA.

The question that is not answered by these figures, however, is whether the 14% per cent of users who didn't buy a single or album after hearing an MP3 was due to discovering they didn't like that type of music or band, or whether the quality of the MP3 was good enough and they didn't see a need to purchase the CD version. The latter is certainly piracy; the former is simply exercising freedom of choice. And I think it's the latter that the RIAA is really afraid of.

The RIAA's antiquated business models are unable to adapt to the revolution of the Internet. Its reaction has been to try to stamp out music sharing programs and even the MP3 format itself. But we, as consumers, love choice.

If we can know exactly what music we want to buy, and buy just that music, we'll be more than happy to do so. For this reason alone, music sharing programs and formats are only going to keep on increasing in popularity - not go down.

Even if the RIAA decides on a protected music format, there's nothing stopping a music lover turning their music into another free format such as Ogg Vorbis (which most MP3 players can already play) and distributing that over anonymous P2P software.

But it's not so much CD sales that are the biggest concern for the RIAA; rather it's the realisation that they will no longer be solely responsible for distribution, and will no longer be able to exercise the control that they're accustomed to, in the future Internet-connected world.

Artists can now make music and sell songs directly to their fans, without paying a hefty cut to the RIAA middlemen. The future will be filled with a pay-per-song system so you can buy singles online in high-quality digital format, or purchase a personalised CD full of just the songs you like, instead of buying an entire album when all you wanted was a single song.

And maybe you'll buy them direct from the band, or maybe from companies that pay licence fees to the bands for the privilege of being able to create custom compilation CDs for consumers.

Either way, the RIAA's role will become increasingly smaller, focusing more on the promotion of bands and not a monopoly of distribution.

The battle between music sharing and the music industry isn't over yet. But don't believe the FUD. MP3s have changed the future of music, for both artists and consumers, for the better.

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Direct and to the point

Microsoft leads with DirectX, hardware follows soon after - but when will the developers catch up and when will we get our T&L? Tim Dean wants a refund.

I remember the days when I first encountered Microsoft's DirectX API. These memories often occur concurrently with twitches and small Tourette outbursts, mainly aimed at Bill Gates, my keyboard and the general concept of an API (Application Program Interface).

It was only version 3.0 back then, and a veritable infant in the world of APIs, and was up against the heavies of 3dfx's Glide, and OpenGL, along with a number of other proprietary APIs. The concept of DirectX was sound – Microsoft would offer a single unified API package that contained mini-APIs for each different component of your PC – not just 3D, but also 2D, sound, game device input and communications. If generally accepted, DirectX could potentially be a complete win-win-win situation for hardware and software developers as well as gamers. Hardware developers would implement the feature in the latest iteration of DirectX, software developers would make API calls to DirectX knowing that all DirectX-compliant hardware would run them, and gamers would get better performance and hardware compatibility.

The problem was that back in the early days there was not a lot of DirectX-compliant hardware; the API was relatively slow, clumsy and difficult to program for; it didn't incorporate nearly as many features as OpenGL in 3D graphics; and its main competition, Glide, was a very slick package that could produce unprecedented results using 3dfx hardware like the Voodoo Graphics and Voodoo2.

Combine this with the fact that games were beginning to require DirectX in order to run, and you got a volatile mixture. I remember my old ultra-budget ISA sound card didn't actually have DirectX drivers, and while many hardware manufacturers worked frantically in order to guarantee that DirectX-compliant drivers were released, the two-bit company that made my sound card didn't seem to care that much about driver updates in general. The result was that I could either run my DirectX games with crappy sound, stuttery sound, no sound or, in a worst case scenario, such as with the Curse of Monkey Island (heh, I still have a little chuckle whenever I think about that game . . .), the game simply wouldn't run at all. Grrr.

These days, thank fuck, things are better. True to form, Microsoft was not tooling around when it decided to put together an API, and it has stuck with the project, releasing numerous updates. The latest iteration, DirectX 8.0/8.1, is truly a marvel in terms of features, performance and industry acceptance. In fact, DirectX is no longer only for the consumer and entertainment market. The latest release of Discreet's 3ds max 4 (formerly known as 3D Studio MAX) features viewport support for both the traditional OpenGL and also Direct3D.

Things are so different now, in fact, that both the top 3D chipset contenders, ATI and NVIDIA, are not improving their products by simply fiddling with the architecture. But they are trying to out-implement each other when it comes to utilising the features of DirectX 8.0. The case in point is the Vertex and Pixel Shaders that caused the main kerfuffle with the GeForce3. Recently, ATI released its plans for the Radeon2, which sports a technology called Smartshader.

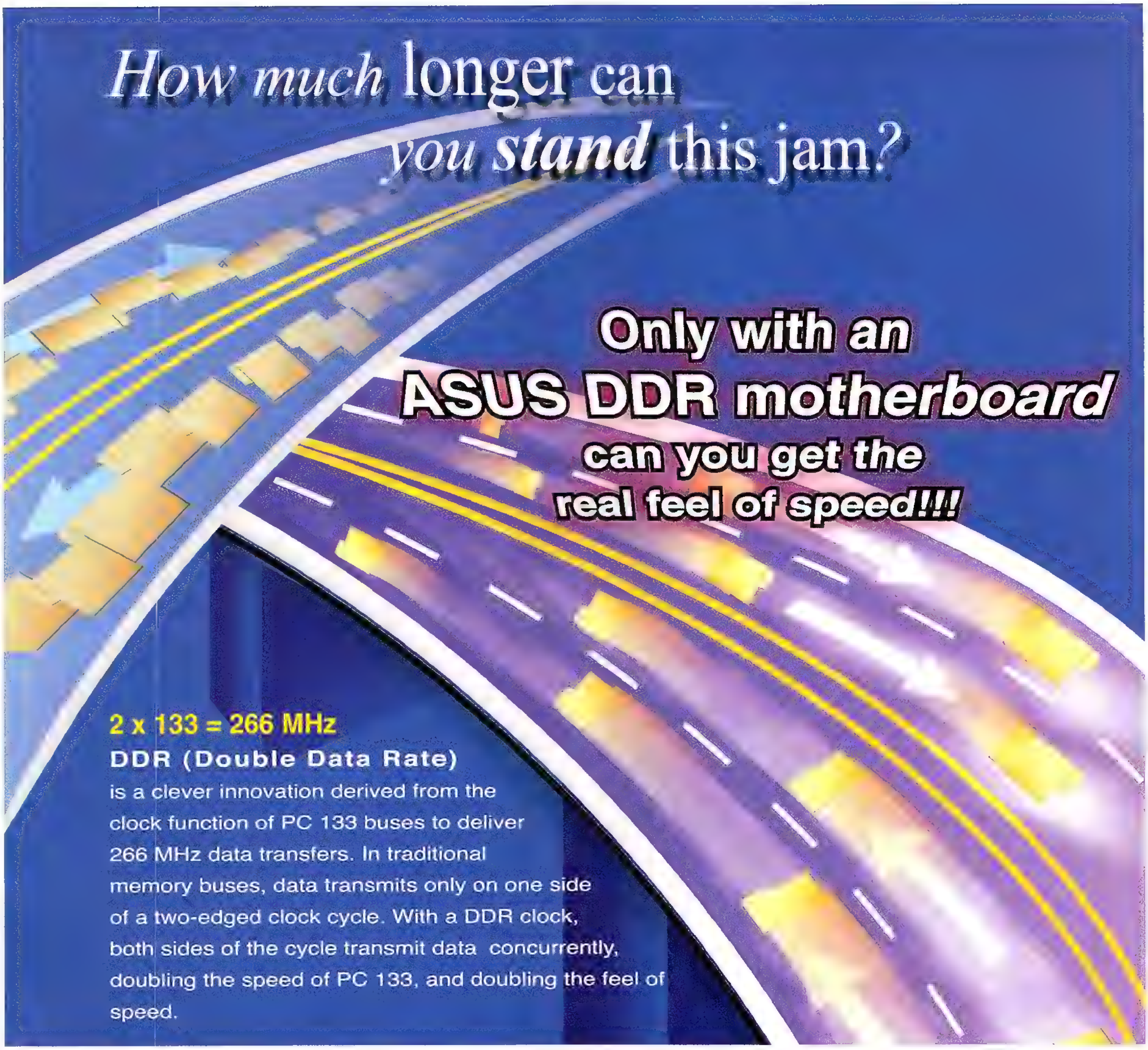
Essentially Smartshader is the same thing as the Vertex and Pixel Shaders in the GeForce3, with a few minor differences. In both chips the Vertex Shader is a special set of instructions for manipulating the vertices (or corners) of polygons which enables detailed deformation and lighting effects, among others. The Pixel Shader manipulates the individual pixels on a surface, enabling effects like bump mapping, reflections and other distortions. The beauty of these shaders is that they are programmable. This means that instead of a programmer writing a fixed line of code to perform a bump map, and another line to perform a shading effect, they can code in their own sequence of effects specific to their needs.

There is not much difference between NVIDIA's nfiniteFX Engine and ATI's Smartshader, except that ATI's offering supports a slightly newer version of DirectX's Pixel Shader, with features such as 'true' phong shading. What difference this will make in the real world is hard to say, although I am keen to find out.

With ATI recently unleashing its channel and allowing third-party manufacturers to make boards with ATI chips, there should be plenty of cards to choose from, and the competition should be fierce in both performance and pricing. With NVIDIA hard at work on the Xbox, ATI might actually have a small window of opportunity to take the crown for the fastest 3D card on the market, although NVIDIA is sure to strike back soon enough.

All we need now is for the software developers to get stuck into DirectX 8.0, and incorporate its features into their upcoming games. We all know how long it took T&L to take off (heck, it's still only barely left the ground), and with the massive potential complexity of the Vertex and Pixel Shaders, it could take quite a while before we start to see games hit the streets utilising them. Who knows, by then we might be up to DirectX 10.0, and the graphics cards might have escalated to not only have their own geometry processor, texture processor and RAM, but also their own hard disk, network chip, FireWire port, CD-ROM drive and toaster.

Hey – as long as the sucker runs Curse of Monkey Island (heh), then I am willing to give it a chance. ▢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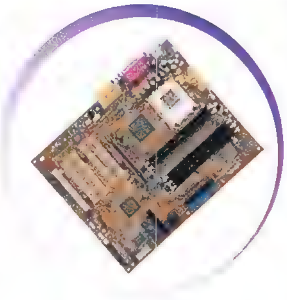

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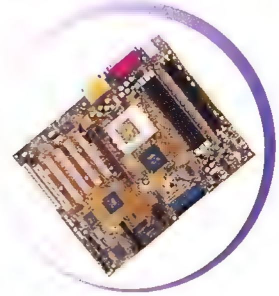

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USB just works great

This month, Dan plugs in and drops out of USB.

USB. Ain't it great? Plug and go, hot-swap, works on any computer with a USB port, highly expandable, decently fast ... what's not to like?

That was a rhetorical question. Put away those lists.

USB, in the real world, is actually one of those things that pretty much works most of the time for a large number of people. On a good day.

This is something that many computer users - on PCs and Macs - discover by painful trial and error, after purchasing various USB-capable kits from a salesthing whose spiel sounds much like my first paragraph above.

Sometimes it's drivers that are the problem. There are lots of USB gizmos that only work on a Windows PC. All they need to make 'em fly on a Mac, Linux box, BeOS machine or what-have-you is a little bit of software that suffers from a mild case of nonexistence.

There are also lots of Windows-only USB gizmos that only work on one flavour of Windows. Never mind Windows 95 Release Seven Super Pack-In OEM Highly Decorated Epsilon Veeblefetzer Edition, which was the first Windows to support USB semi-properly. Also never mind Windows NT 4.0, which can sorta-kinda support some USB devices with special third-party software. No, we're talking here about Windows 98, Windows Me and Windows 2000. You can find USB gadgetry that will only work with one or two of them, but which commonly has a driver that merrily pretends to install on other Windows flavours.

Things are getting better in that department, though. I've got a CompactFlash memory card reader that works as a USB Mass Storage Device. That means you only need to install a driver for it at all if you're using Windows 98. On Windows Me, Windows 2000 and USB-capable Macs, you just plug the thing in and it works.

Well, it sort of works. The computer I'm using at the moment is pretty close to fine as far as USB gear goes, but it still occasionally has a conniption over the CompactFlash card reader. Apropos of nothing, there's a temporarily frozen mouse pointer and errors to the effect of 'Card reader? What card reader? You've unplugged it! Why did you unplug it?! Bad user! Bad, BAD user!' The thing's still plugged in, of course. But now it's stopped working until I genuinely unplug it and replug it.

There are a great many things that can cause PC USB subsystems to behave in whimsical abstract ways. Often, crummy motherboard hardware, or crummy OS drivers for perfectly alright motherboard hardware, have something to do with it. Hours of fun can be had in the support forums, knowledge bases and newsgroups hunting for the Holy Driver Patch of Antioch.

Some machines that seem to have USB problems actually just have USB power supply problems. Plug a self-powered hub into one of their ports, and the rest of your USB kit into the hub, and everything's fine.

If that doesn't help, the quick, dirty and not-very-expensive way to solve the problem is to disable the motherboard USB root hub in the BIOS setup and buy a separate USB card for a PCI slot. This violates the no-screwdriver promise of USB, but the cards are cheap enough and give you two or four ports which, generally speaking, Just Work in exactly the way that USB is meant to.

Don't all you brand-name computer owners start getting smug about this, by the way. Plenty of rounded-corners, pastel-box, nancy-boy, brand-name machines have bizarre USB faults, too, leaving their users waiting until Windows has loaded before they plug in their Webcam. Or flashing the BIOS over and over to try to find the One Golden Version that'll make the mouse stop freezing at random moments. Or offering up a prayer to the Goat With A Thousand Young before they plug in their handheld's USB sync cable.

But all this is SO much better than it used to be. Because in the olden days, laddie, we didn't have USB. We had serial connections for slow devices. They weren't too annoying, on the whole - provided you didn't have to wrestle for eight hours with some insane bar code reader that turned out to want seven data bits, full parity, one point five stop bits and a sprig of parsley.

For expensive, fast devices we had SCSI. That was usually OK, too, as long as you never had to deal with early Macintosh hardware that looked like a SCSI duck, quacked like a SCSI duck, but was actually a hairy-nosed wombat with tentacles. When normal SCSI gear went weird, just fiddling with everything's ID numbers often solved the problem, for no sane reason.

For cheap fast devices, though, we had parallel. I'm pretty sure that was bad for some reason. But the shock therapy's blanked out all memory of it, I'm afraid.

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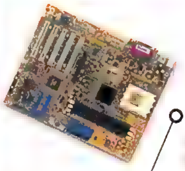

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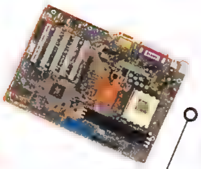

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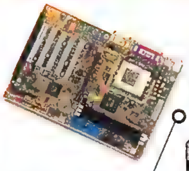
- 5 PCI / 1 CNR / 4 USB ports
- AC'97 sound
- ATX form factor



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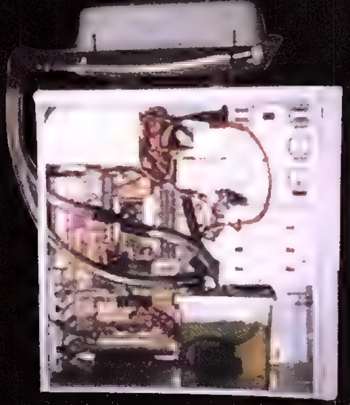
Leo's vented fury



Technical details

- AMD Athlon 700MHz@1GHz
- ASUS K7M motherboard
- 256MB PC133 RAM
- Barracuda 30GB ATA/66 HDD
- Fujitsu 20GB HDD
- Creative Sound Blaster Live!
- ASUS V6600 GeForce 256
- Four-switch fanbus
- Rounded IDE cables
- Ducted radiator
- Modified PSU
- Video card RAMsinks
- Perspex waterblock
- Waterblock mount mechanism

The story

The radiator for this water cooling setup was acquired from the local auto wrecker for $40. It's a Holden transmission cooler. The fanbus and baybus were built from parts purchased at Jaycar Electronics ($30). The water pump, named the Pondmaster 800, came from a landscape gardening store ($50). It's a tiny thing, very quiet and has behaved well so far. The bottom of the ATX power supply was cut away and shrouded using a spare 120mm fan grill to aid airflow. The actual waterblock used to cool the processor started its life as an old 486 heatsink (that cost a whopping $1 from the computer fare). I then built a perspex box to encase it and glued all of it together using some Araldite.

I purposely chose to go for an all-aluminium water cooling setup, simply to cut down on the maintenance that is usually associated with copper/aluminium systems, and the swag of chemical problems that go along with that. ▢

Chris' control freak

Technical details

- AMD Duron 700MHz@990MHz
- EPoX 8KTA3 motherboard
- GeForce2 MX graphics card
- Promise Ultra66 RAID
- 20GB 7,200rpm HDD
- 10GB 5,400rpm HDD
- Dual ATX power supplies
- Travan Tape Backup Drive
- Northbridge/Southbridge cooled
- Netgear FA310Tx 10/100 NIC
- 56K PCI modem
- 23 fans!
- 12in blue neon
- Custom perspex window

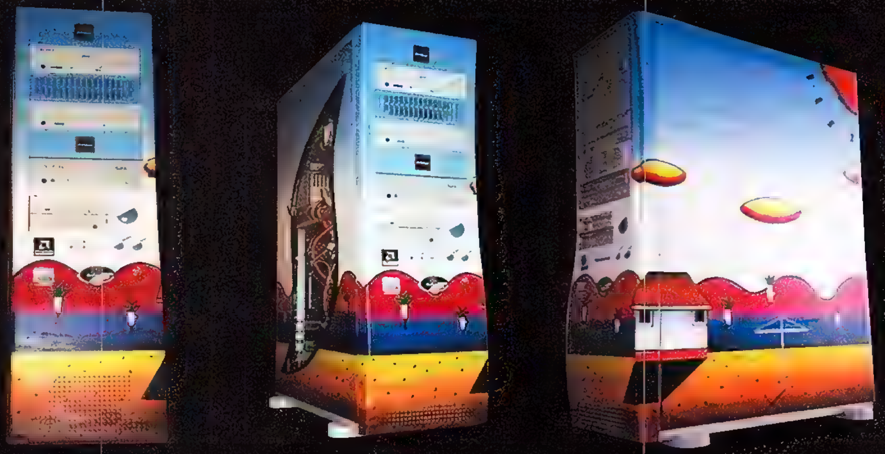
The story

This system started off with a plain old full tower ATX case, which I spent weeks modifying to make it look like it does. The system originally had a Celeron 366MHz@550MHz, which was soon replaced by the demon Duron that now dwells within. The GeForce2 MX started off without a fan – just a plain heatsink that was soon replaced with the Golden Orb. After fitting the Orb I managed to wind the core up to an incredible 255MHz. I sourced some tubing and a 12in blue neon from a car parts store. The customised panel was made out of an old, spare 5.25in bay panel. It has audio in/out, a headphone jack, video out, fan controls and a RAID controller as well.

The perspex was sourced from the Tech Studies faculty at school (but shh, nobody knows about that!). The added cooling reduces my temps to 36°C for the CPU and 19°C for the motherboard at full pace, although it is extremely loud. It looks like the next upgrade (in the far-off future) will be an Athlon 1.33GHz with a GeForce 3. ▢

The best atomic readers' custom cases. Each hot box scores its owner a six-month subscription to atomic.

Reags' Mambox



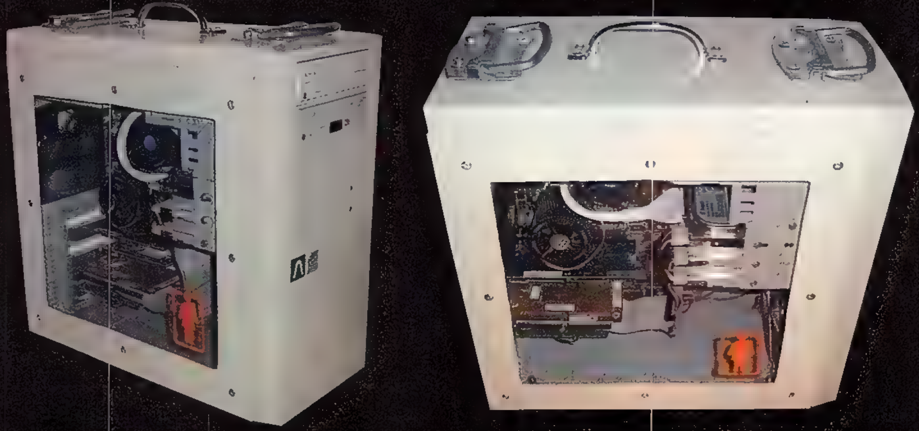
Technical details

- AMD Athlon Thunderbird 1.2GHz
- ASUS A7V133 motherboard
- Creative Sound Blaster Live!
- Creative GeForce2 GTS
- Sony 32x/10x/4x CD-RW drive
- Pioneer 16x DVD-ROM drive
- Creative 52x CD-ROM drive
- 1.44MB floppy disk drive
- Iomega Zip 100
- Clear, rounded IDE cables
- FC-900L PCI exhaust
- Twin Turbo bay exhaust
- Two Just Cooler Case fans
- Mambo-inspired paint job

The story

Well, what can I say? I've always been intrigued by Mambo, so I couldn't resist. This project utilised acrylic paints, undercoat, a black texta, picture varnish (because I'm el-cheapo) and about four weeks of time in between uni work. The twisty shape window came in last, as I didn't have the tools to cut it. Thankfully a mate was kind enough to pull it off for me . . . symmetrically too. I decided to use all internal pre-made cooling gear, because I wanted to preserve the original look of the case without cutting out too many bits. Originally I also had a triple fan HDD cooler for the bay slot, but I replaced that with the Twin Turbo as it was much more efficient and looked better. As for overclocking, the current 1.2GHz speed serves its purpose well enough for me for uni design work *cough* *CS* *cough*. This is my first case mod and I really had fun making the 'Mambox', I hope there's more to come in future – and Lisa, you look aesthetically pleasing (oh please, please put that last bit in atomic Ben).

Bob's Monkey box



Technical details

- Dual P3 550MHz@733MHz
- ABIT VP6 motherboard
- GeForce2 MX 400 video card
- 256MB PC133 SDRAM
- Seagate 20GB 7,200rpm HDD
- Seagate 30GB 7,200rpm HDD
- ABIT Hot Rod 100 PCI
- Sound Blaster Live! VE
- Two RealTech NICs
- Two SuperOrbs
- Blue Orb (chipset)
- TenMaXX Lasanger
- Dual 120mm case fans
- AOpen HX45 case

The story

My box contains dual Pentium III 550MHz@733MHz CPUs on a VP6 motherboard with 256MB of SDRAM. I have a 60GB RAID setup with two Seagate 30GB 7,200rpm hard drives on an ABIT Hot Rod 100 RAID card. The primary hard drive is a 20GB 7,200rpm drive.

The window was cut using a dremel, along with the front and back 120mm fans. The HSFs are SuperOrbs, which replaced the dual FOP-38s I previously used. After a few weeks I had a touch of 'industrial deafness' from the FOP-38s, and that's when I decided to replace them with the quieter SuperOrb. You will also notice a shoulder strap, which I use to carry the box. I catch the bus to work and find carrying the PC much easier, as well as being extremely stylish. Being the only bloke on a bus with a fully decked PC ownz all the suits and their pretty little laptops. Sometimes I worry that the bus will have an accident and my box will end up in bits. But when I think about it, I'd be in bits too, so that's cool.

Proud of your hot box? Send a low-res pic of the front and side to hotbox@atomicmpc.com.au. We'll be in touch if we like what we see.

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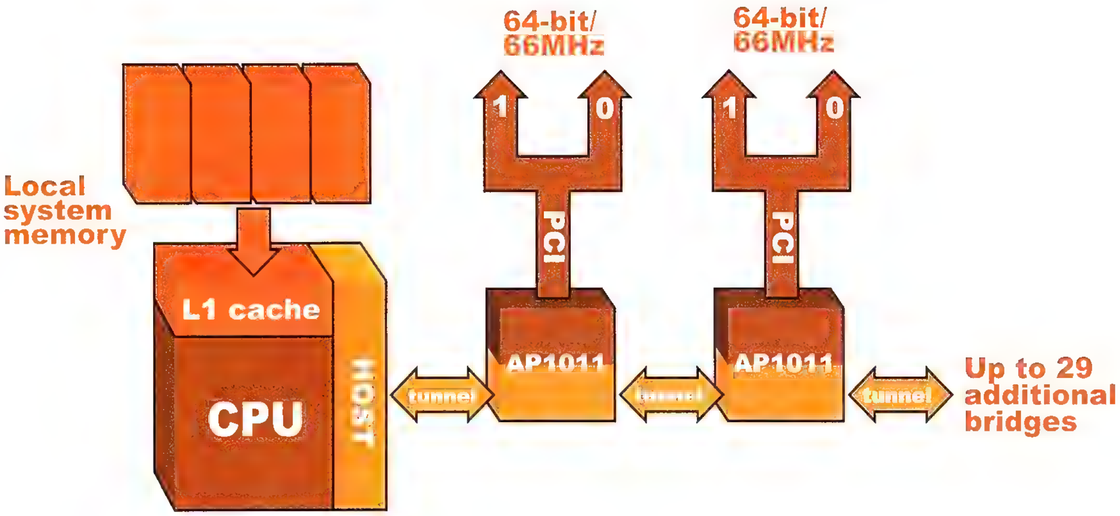
HYPERTRANSPORT

Bandwidth-hungry Simon Peppercorn delves into AMD's new I/O standard.



The I/O standard as we know it is undergoing a major overhaul, and it's about time. However, for a new technological standard to survive it needs four things. First, it must work. Second, it must be compatible with other standards. Third, it must be able to evolve and adapt to the forces around it. And above all, it must be supported.

Lets go back to basics. Your PC is made from a number of different bus types. Each of these bus types provides a route along which data can travel. Your I/O bus, also known as an 'expansion slot bus' or even 'system bus', is the one through which most of your data travels. It is not your actual expansion slot as such, but is the circuitry that links those slots to your CPU and other subsystems. This bus is used by almost every device in a PC, and is absolutely critical in the overall performance and speed of your system, yet it is arguably one of the most poorly developed areas of technology in today's PC market.

The basic architecture of the I/O bus has remained virtually unchanged for about 20 years. One of the reasons for this has been the general industry's inability to set a new standard for its development, which was still compatible with previous bus systems.

Since 1984 we have seen the introduction of various I/O bus cards, with the primary difference between them being the amount of bandwidth they provide. The Industry Standard Architecture (ISA) bus first saw the light of day in 1981. This 8-bit bus ran at 4.77MHz. When IBM released the 80286 with a 16-bit bus in 1982, the ISA bus was developed to run at 6MHz and then later to 8MHz.

Here was the problem. The new 80286 processor used a 16-bit data path, instead of the previous 8-bit data path. Even though the processor would work on a board with an 8-bit bus, the overall performance would take a massive hit if it couldn't run at its potential 16 bits. And who wants their computer to run slower than it is capable of?

The solution was to create an expansion slot and bus that supported both 8- and 16-bit cards. This meant that the motherboards had to be able to, over the same bus, run the processor and the expansion slots at different speeds.

The standard then became a 16-bit bus with an 8MHz clock speed, and this is where it stayed. Throughout the '80s and '90s the mass creation of ISA-based expansion cards meant that the ISA standard has stuck around.

Then came the move to 32-bit architecture. The CPUs came first – once again, before a bus standard had been developed. In their rush to get 32-bit processors to market, some eager vendors developed their own proprietary buses. Needless to say, that's when it started to get messy.

IBM had a good shot at introducing a new standard with the 10MHz, 32-bit Micro Channel Architecture (MCA) and, soon after, the Extended Industry Standard Architecture (EISA). But neither were compatible with each other and they failed to become an accepted standard.

When Microsoft created a graphical user interface (GUI) for its operating system and called it 'Windows', there was some pressure to develop a faster graphics system. What began to emerge was a range of local bus peripherals. After a few proprietary attempts at integrating the graphics controller with the hard disk controller, the Video Electronic Standards Association (VESA) come forward with a new bus standard. VESA was high in performance, widely accepted and became a featured component of the 486 system. The neat thing was that it worked. As a result, graphics cards flourished and a new generation of gaming development took place.

The bad news for VESA was that because it was tied closely with the clock speed of the processor, and processors were getting faster, the VESA Local Bus (VLB) had difficulty keeping up.

So in 1992 Intel emerged with the Peripheral Component Interconnect (PCI) bus. This created a layer between the CPU and the standard I/O bus. With direct access to the system bus, and isolated from the processor itself, overall system performance increased. The PCI bus was able to run at fixed speeds, independent of the clock speed of the CPU. Originally rated to run at 33MHz, it was later increased to 66MHz when PCI 2.1 was developed.

PCI-X 1.0 spawned from PCI local bus in 1999. This was fully backward compatible with PCI and supported one 64-bit slot that ran at 133MHz. It was created to specifically address bandwidth issues in areas such as Ultra3 SCSI and Gigabit Ethernet, and other high-end performance requirements. It was acknowledged that this was only an interim solution to the problem. No matter how fast PCI was, it couldn't keep up with the demands bandwidth increasingly made on graphics performance. Intel plugged the gap with Accelerated Graphics Port (AGP), which acted as a central bus between the processor, system memory, graphics chipset and PCI bus. AGP was able to double the PCI clock speed. It also meant that AGP was able to treat system memory as if it was actual memory on the graphics card.

With processor speeds getting exponentially faster, the traditional ISA bus was bottlenecking the ability of the processor to access wider data paths. So Microsoft and Intel devised the PC 99 standard. After much wailing and gnashing of teeth they finally called for the complete removal of the ISA slots. This move forced the industry to look at developing new standards whether it wanted to or not.

Sadly, PCI is now starting to show a few cracks around the edges, as advancements in technology have pushed its abilities to the limits. AMD has been working with a number of 'partners' to devise a new and improved alternative. It looks as though it may have hit he mark.

HyperTransport has emerged as the likely contender. Eventually, it will replace the PCI bus and perhaps the AGP bus. It was first presented to the public in 1999 at the Microprocessor Forum. Previously codenamed Lightning Data Transport (LDT), the operational specification version 1.0 was completed in May 2000. HyperTransport technology will be seen in AMD devices in the first half of 2002, though you may see it in other manufacturers' products even sooner.

This new development in I/O technology is currently being customised for a whole raft of devices such as PCs, game consoles, mobile and handheld devices, routers and hubs.

HyperTransport allows for integrated circuits to be interconnected using point-to-point, unidirectional links. The theoretical bandwidth between circuits can be up to 50 times faster than PCI. Where PCI can transfer data at approximately 133MB/s, HyperTransport has a maximum transfer rate of 1.6GB/s. By using a 16-bit transfer each way, an aggregate bandwidth of 6.4GB/s is achievable. According to AMD, these unidirectional links can be from 2 to 32 bits wide.

The technology centres around a point-to-point, packetised bus which uses tunnel devices that can be daisy-chained on a single I/O link. This means that the source containing the packet of data to be sent is connected directly with the destination point of the packet. There is ample bandwidth available to allow multiple components to be daisy-chained.

The data rate of HyperTransport I/O is 800Mb/s per pin pair, with a 400MHz clock. In other words, 4 bits each way provides 400MB/s, which gives a total aggregate bandwidth of 800MB. If you have 8 bits each way it equals 800MB/s, giving a total 1.6MB/s aggregate bandwidth. Sixteen bits each way totals 6.4GB/s, and so on. To achieve four-byte granularity, the bit times are concatenated for links of less than 32 bits. This will all take place transparent to the operating system, without the need for drivers.

HyperTransport is going to eliminate many of the data transfer bottlenecks that are a part of every system, and manufacturers will be able to integrate more processors. The lack of multiple processor systems has prevented AMD making any inroads into the lucrative server market.

Unfortunately, HyperTransport has not been developed for connecting peripheral devices such as removable drives. At the moment, HyperTransport is designed for the interconnection of integrated circuits that centre around the core of a system.

So who is interested? Industry leaders such as Cisco Systems and Sun Microsystems have announced plans to use HyperTransport technology in future products. But why wouldn't they?

Even though AMD acknowledges that it's going to be an uphill battle to establish this as the new I/O standard, by allowing use of HyperTransport technology virtually royalty free, it is guaranteed widespread support.

NVIDIA has announced that it will be incorporating HyperTransport into its future nForce platform. This is going to provide six times the bandwidth between the IGP (Integrated Graphics Processor) and the MCP (Media and Communications Processor). This bandwidth boost also allows NVIDIA to implement full Dolby Digital 5.1 3D audio processing and encoding by the MCP in real time. Now that's neat!

NVIDIA's rival, ATI Technologies, has also pledged support for HyperTransport in future graphics processor products, and has declared support for the standardisation of this new technology

≥

throughout the industry. This also means that we should expect to see HyperTransport used in ATI's rumoured core logic chipsets for both AMD and Intel processors. These chipsets should appear some time next year.

California-based Transmeta has announced that it will be using HyperTransport in its future range of x86 64-bit processors. Transmeta has been producing the Crusoe range of processors, which are primarily geared towards the mobile computing market.

Another major developer, API Networks, is also taking the plunge and introducing HyperTransport into its range of communications devices. This is going to boost performance of devices such as servers, routers and optical switches, among others.

So far, over 100 companies have jumped on the HyperTransport bandwagon. This is going to bring the performance levels of your PC to new and lofty heights, and give Intel a serious run for its money.

Naturally, the talking heads at Intel have been poo-pooing the HyperTransport hype. While they acknowledge that there is much work to be done in the I/O area, they are claiming that HyperTransport isn't scalable or flexible, and that it doesn't '. . . have the legs to run for the next 10 years'. Yeah, right. With the significant amount of weight being thrown behind HyperTransport from all corners of the industry, you can expect to see it around as a standard for a long time.

However, Intel executives haven't closed their eyes, stuck their fingers in their ears and said 'la la la'. Intel is claiming, to anyone who will listen, that it is in the process of developing the next generation in I/O standards. The company is not prepared, however, to disclose the details until it is good and ready.

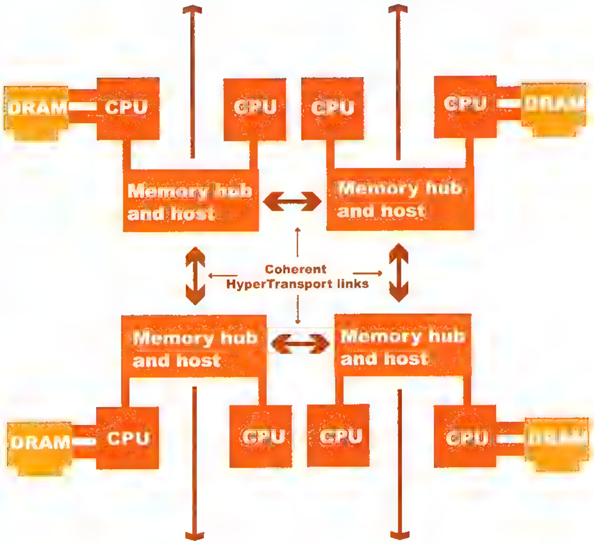
This isn't Intel's first crack at replacing the ageing PCI standard. A couple of years ago it tried to introduce Next Generation Input Output (NGIO), but it failed miserably because heavyweights such as Compaq, IBM and Hewlett-Packard refused to give it their support. Many believe that Intel is going to try to release what could be labelled as NGIO 2.0. Intel deny this, suggesting that what it's developing will be closer to Infiniband.

InfiniBand is designed to be able to connect computers, whereas NGIO and HyperTransport are solely designed to connect components within a computer.

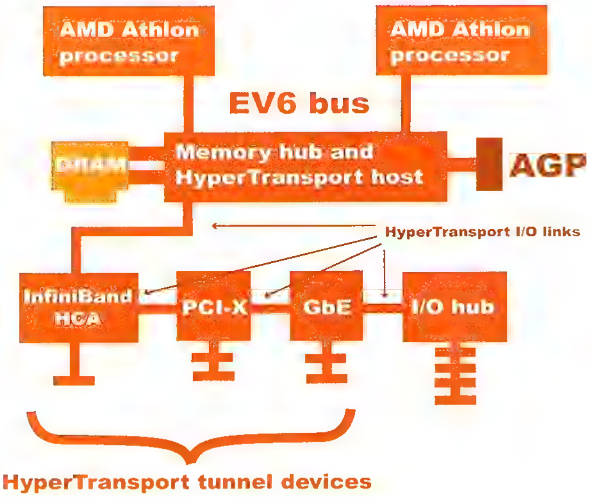
So who's going to win this battle? My money is on AMD. Particularly in the gamers market. The nForce from NVIDIA combined with HyperTransport technology is going to create some serious, butt-kicking waves throughout the gaming development community.

Stay tuned. ▢

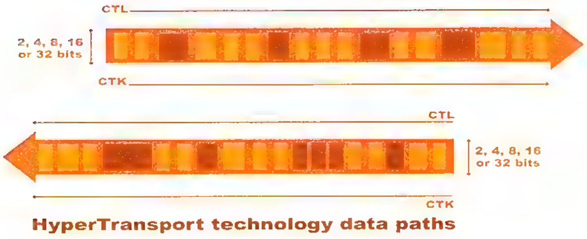
HyperTransport in the real world



ⓘ In multiprocessor systems, HyperTransport can be used between multiple Northbridges as well as the Southbridges and I/O links.



ⓘ HyperTransport acts to link the Northbridges and Southbridges of a motherboard chipset, and forms an integral part of the I/O system.



ⓘ HyperTransport uses two unidirectional paths of 2-, 4-, 6- or 16-bit widths are used, dealing with data in packets that are a multiple of 32 bits in length.

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Yeah right, show us the chip, then we'll start taking you seriously

Bitboys vice-president Kirk Leitch reveals some actual, real information to atomic's James Wang.

I am Kaj. Do not be afraid of my body.

atomic: Who thought of the name 'Bitboys'? Any significance in the name?

Kirk: It was Mika and his brother Kaj Tuomi who came up with the name in 1991. It was thought that the name best described the brothers.

atomic: What will Bitboys offer to all those hard-core gamers out there?

Kirk: Without getting caught up in making claims about performance that seem to get people hot under the collar, we want customers of Bitboys' products to have a great experience playing their games on our hardware. I know that sounds like a bunch of marketing fluff, but it is the truth. As a gamer myself I know the things that are most important to me, like consistently high frame rates regardless of what's onscreen, and the quality of the visuals – these are the things I look for in a graphics card.

If you are getting at least 60 frames per second (fps) in all resolutions, wouldn't it be great if you could also have all the cool features turned on without dropping down to 10 or 15fps? I know when gamers are playing online and they are getting fragged because of the inability of the hardware to deliver a consistent frame rate – say, when 4x full-scene antialiasing (FSAA) is turned on – they start to disable features until the frame rate comes back up. All these new features that we're hearing about aren't much use to the hard-core gamer if they have to turn them off to get the performance they need. Why can't they have it all?

atomic: How would you describe Bitboys' vision in the graphics accelerator market?

Kirk: We feel that there is still a lot of room for growth in the 3D market, both from a hardware standpoint and a software perspective. The technology in hardware continues to improve and get more complex. Software also getting more complex, and more developers are coming up with some really cool stuff for their games. But it's going to require some serious hardware to take full advantage of these ideas.

We've talked with some game developers to get an idea of where games are headed in the near future and clearly we are looking at some impressive-looking titles. Very high polygon counts (up to 600,000 per scene) and cool special effects (using DirectX 8.0) are going to be the hot topics for these titles in addition to great gameplay. What that means is, users will have to have some pretty impressive hardware to keep up. Adding things like 32-bit colour, 32-bit Z, FSAA, high-depth complexities, 1,024 x 768 and above are going to make these titles very taxing on any hardware. How to put all this onscreen in real time at high frame rates is what presents such a challenge to graphics chip makers.

There are several different architectures out there trying to solve the biggest problem we have in 3D graphics today – memory bandwidth. All of the cool new features are going to add new levels of realism, but most of it is still going to be limited by the amount of memory bandwidth available to render these effects in real time. Xtreme Bandwidth Architecture (XBA) has been designed to eliminate the memory bottleneck to enable the graphics engine to do what it does best, and that is to process very high-quality pixels and lots of them. As the level of detail and realism continues to climb higher, we'll see the requirements for hardware grow as well.

atomic: Is it true Bitboys' engineers were behind the Pyramid3D that featured programmable T&L for gamers back in the days of the Voodoo1? Why didn't the Pyramid3D ever materialise? Had it been released, would game graphics today be radically different?

Kirk: Yes, it is true; Bitboys' technology was in Pyramid3D. Also, Pyramid3D not only had a programmable T&L engine, but also a programmable pixel shader. The Pyramid3D was ready and working in 1997 when TriTech Microelectronics, a Singaporean company who was to market the part, went bankrupt. If the product had been released, it would have accelerated the evolution of programmable graphics hardware. Graphics in general still benefited from the part in that Bump Mapping was first seen in Pyramid3D and subsequently licensed by Microsoft.

atomic: What has changed in the past year or so for Bitboys? With Shane Long as CEO, has Bitboys taken a new direction?

Kirk: As a company, we have grown quite a bit in the last year. From around 10-15 people a year or so ago to having 40-45 people working on the chip today has helped us make tremendous progress on our next part. As for Bitboys taking a different direction since Shane came onboard, I don't really think that is the case so much as his joining the company has helped to grow the company and acquire the capital required to get a part to market. There's a big difference between having a handful of people trying to get a 3D part to market and having 45 working to get the part out. The company's focus has always been to provide gamers with the best performing hardware around for high-end 3D games and that has not changed. Are we going about it a bit differently now? Yes, but the primary goal is still the same.

atomic: What has being the main problem preventing Bitboys from releasing a working card over the past few years? And what has been done to ensure successful execution in the future?

Kirk: I don't know that there has been one single thing that has prevented Bitboys from releasing a product to market. Developing 3D graphics silicon is such an undertaking these days. If you look at some of the other companies that are developing silicon today, and some of the ones from the past, you'll see that they generally have (or had, as the case may be) hundreds of engineers in the company working on a product or product family. I'm not trying to imply that simply having bodies gets you there. You have to have very talented people dedicated to the project. Make no mistake: the level of complexity of 3D graphics chips today is not unlike that of CPUs, and one could argue that they have surpassed CPUs in the level of complexity. In addition, it takes a strong fab* partner to bring a part to market. Getting it manufactured is a big part of the process. As for future execution, we have a great team of engineers working on the part and we have a great fab partner in Infineon.

atomic: What kind of business model will Bitboys adopt? Will you be producing your own board or will that be left to third-party companies?

Kirk: We are a fabless semiconductor company in the sense that we design 3D graphics, contract with a fab to build the chips and then sell them to our customers who will build end products with them. We will not produce our own boards for retail sale. As indicated on our Web site, Infineon will be building our product for us.
[*fab = fabrication plant, where chips are produced]

atomic: Is there a specific market segment Bitboys is targeting? Do you envision expanding into the high-end workstation market? How important will the OEM and low-end sector be for Bitboys?

Kirk: Our initial target market is the extreme gamer. That is a very demanding market, but also one that appreciates good technology. As for other markets, as we continue to grow we will evaluate other opportunities to see if they make sense for Bitboys. OEM business is important for any graphics chip manufacturer that has aspirations to achieve the kind of success that top-tier graphics companies have enjoyed both now and in the past.

atomic: What's your view on 128MB graphics cards? Are there any real benefits?

Kirk: In this business, I've learned never to say 'What would you do with all that memory?' Extra frame buffer memory can always be used for more textures. Also, some graphics chips will need that extra memory to do high-res 4x antialiasing. The only issue there is cost. Yes, memory prices are low and they may go lower still, but more memory always means more cost.

atomic: How do you see the balance between the CPU and GPU? Could the CPU's role in rendering be made redundant by fully programmable GPUs?

Kirk: The best thing about the 3D graphics market is that there is so much headroom in the performance requirements curve. If you look at what the best computer animation is right now and recognise that it was not done in real time, we have a long way to go before we get to the level of realism of something like *Jurassic Park* or *The Phantom Menace*. The problem with the CPU doing the rendering in software is that a CPU is not optimised for the task. It takes time to load the software and run it with the instruction sets that a CPU has. Hardware will generally run much faster than software trying to emulate hardware. That is why we have dedicated hardware in 3D silicon. It is optimised for the task and there is less overhead associated with running on a dedicated piece of hardware, not to mention no competition for processing time from an email program, Internet browser or antivirus program.

As for CPUs becoming redundant, I don't think that will happen anytime soon. Will there be a GPU or a combination CPU/GPU that could handle everything? Perhaps. We already have integrated graphics chipsets on low-end machines, but the graphics performance is nowhere near what a gamer would call acceptable. Sometime in the future that may change. I know that as a gamer, I like the flexibility of being able to upgrade the CPU and the graphics independently. That way, I'm not locked into one or the other.

atomic: How much does your knowledge of your competition's next generation product influence your design team? Have Bitboys ever being caught up in the dilemma of feature creep?

> 'Kaj's face is the "Matrix guy" in the game benchmark 3DMark2001.'

Kirk: It does to a degree. If 90% of the graphics chip companies are designing in a particular feature, you don't want to be the only one without it. However, of much more importance is what is being used by game developers from the various APIs. Games in development right now that we will see coming out over the next year or so will utilise DirectX 8.0 Vertex Shaders, for example. As the number of games with that feature increases, the hardware has to support that in order for it to be attractive to the game buyers, regardless of what the 'other guys' are doing. The better the match between hardware and software, the more likely it is for a new card or game to succeed.

Feature creep can definitely be a huge problem. We've seen that in the past with some of the other players, a lot of which are no longer in business. It means taking a little extra time up-front to be sure you have the right feature set before you get too far down the road.

As for knowing what the competition is doing, yes, you can figure out quite a bit about the feature set that is going to be in a given part. Most of that comes from reviewing forthcoming specs, such as the DirectX 8.0 and DirectX 9.0 specs. Sometimes, the real issue is how they are going to implement that feature set.

atomic: What's the relationship between Bitboys, Remedy Entertainment and MadOnion.com? Many of the technical crew for the three companies are the descendents of Future Crew, but do you still maintain close contact? Is it true that the bad-arse with the Uzi in the bank screenshots of Max Payne is Mika Tuomi of Bitboys?

Kirk: All three companies have roots in some way or another that date back to the Future Crew days. They still keep in touch quite often. It is also true that Mika's and Kaj's faces are used in their productions. Kaj's face is the 'Matrix guy' in the game benchmark 3DMark2001.

atomic: Your site shows XBA as having a 512-bit data path, while the text says 1,024-bit. Does this mean it's 512-bit per chip and 1,024-bit for a dual solution? Do multi-chip solutions have a place in the market?

Kirk: It should be 1,024, not 512. Little glitch in the document. We'll get that taken care of. Multi-chip solutions have a place in the consumer market if they really provide a significant advantage over single chip

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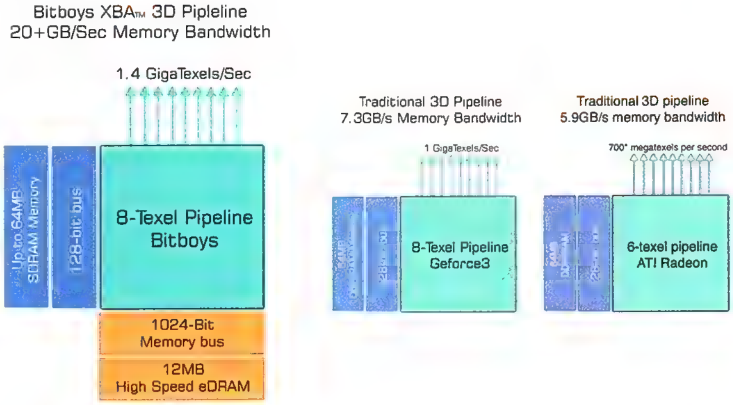
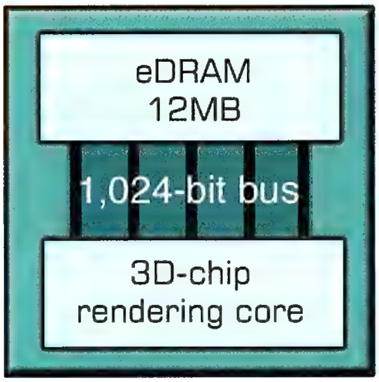


ⓘ Xtreme Bandwidth Architecture has the frame buffer on chip. This consists of 12MB of eDRAM connected via a 1,024-bit memory bus. This is eight times larger than the 128-bit bus employed on modern cards. However, the texture memory is located off chip, using the traditional 128-bit bus and SDRAM. Overall, a bandwidth of 20GB/s should be achieved, dwarfing the Geforce3's 7.3GB/s.

*Assumes bandwidth-constrained situations. Also depends on Z-optimisation.



ⓘ The heart of the XBA chip – 12MB of eDRAM storing the frame buffer fed by four dual-texturing pipelines. Traditional architectures are limited to a 128-bit bus as doubling to 256-bit, causing a doubling in pin count, making the board too expensive. XBA can boast a 1,024-bit bus, because the RAM is embedded onto the die – only possible on Infineon's new 0.17-micron process.

solutions. As an analogy, when Voodoo2 first came out with SLI support, having that second Voodoo2 card in the system added 1,024 x 768 mode to games and a significant performance boost. That being the case, many of the first buyers of Voodoo2s actually purchased two of them at the same time, according to data from 3dfx, at $299 a piece. There was a real advantage to having two cards in the system at the same time. It was the same with Voodoo5s over Voodoo4s. Two chips meant much better performance, especially with FSAA turned on. If a multi-chip solution can provide that same sort of performance at a reasonable cost, it has a place in the market. Who wouldn't want to play a game at 1,600 x 1,200 x 32 bits per pixel, FSAA, 32-bit Z, and so on, at 60fps or better?

atomic: Does Bitboys have close ties with game developers? What features do developers most demand? How much influence does this have on the direction of your engineering team?

Kirk: That is something that we feel strongly about. We know that it is imperative for us to have a close relationship with game developers for several reasons. We need to know what features they plan to include in their next-generation titles. They need to know when we are going to have those features supported in our parts. Both need to be sure there is a fair amount of testing done before either the hardware or the software is released. Some of the common themes we have heard from developers include more texture engines for faster rendering of pixels with multiple textures applied, 64-bit internal rendering for better colour precision, support for DirectX 8.0 features and more flexibility in the Vertex and Pixel Shaders (more of an API thing, actually), among others.

This does influence the direction we take on the design and architecture of our products from the perspective of the feature sets we will support. How we get there is totally up to us. It used to be that the 3D market was shaped by hardware, and software just had to deal with it. Now, it is more of a partnership. With games taking as long as they do to develop, you have to be sure that the hardware that you are going to run on is capable of handling the game. Conversely, you don't want to have a piece of hardware with a lot of esoteric features that no software will support.

atomic: Inter-corporate politics now plays a large part in a company's success. We've seen dirty tactics from Microsoft and NVIDIA, from the oppression of specific APIs to propaganda-style PDFs. Life for a low-profile company trying to enter the high-end 3D market isn't exactly going to be easy, even with cutting-edge technology. Would it be safe to say, 'Gone are the days when pure innovation will make a company the leader?'

Kirk: I don't think so. Life is never easy for anyone starting out with a new product. If a company plays to its strengths and focuses on its goals, it has a much better chance of succeeding. Generally speaking, if someone spends so much time trying to come up with ways to downplay a technology, it usually means they feel threatened by it.

Innovation is key to getting to the next generation of hardware that starts to approach a level of realism yet to be achieved. By their nature, the current architectures are going to be limited in what they can do. New ideas are needed to get past where we are today. New manufacturing techniques and process technologies are needed to enable these new ideas.

Take embedded memory, for example. Five or six years ago, 12MB of memory in a graphics part would have been impractical, if not impossible with the process technology available then. Our XBA makes that a reality when coupled with advanced processes from our fab partner. Why is this important? Memory bandwidth limitations are now a thing of the past – they are for us, anyway.

atomic: Any comments on those who have continuously flamed Bitboys

Kirk: We can understand why people are not very understanding of the lack of hardware in the last couple of years, so the flaming is just part of the deal in 3D graphics. We are committed to sticking with our plan to provide gamers with the best performing hardware, and we know that may elicit some negative comments. Even Santa has to wait. ▢

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INSIDE THE GAME BOY ADVANCE

Dan Rutter destroys a Game Boy Advance – all in the name of science, of course.

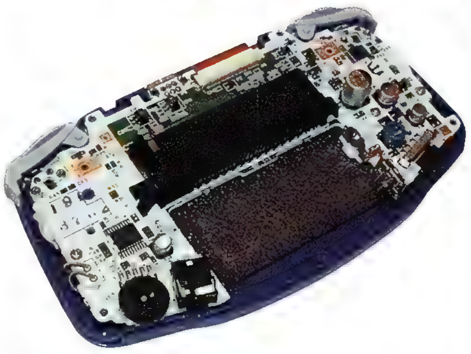
In several respects, Nintendo's new Game Boy Advance (GBA) qualifies as a somewhat updated Super Nintendo Entertainment System (SNES). But it happens to have its own little screen, runs on two AA batteries, and fits in your pocket.

OK, it's almost twice the price of the Game Boy Color. But there's a reason. Its CPU is far more powerful than any other handheld game's, its screen is bigger and a higher resolution, it's got better sound, and it works with all of the old Game Boy and Game Boy Color games as well as the new GBA-only titles. And it's about the size and shape of a Game Boy Color turned sideways.

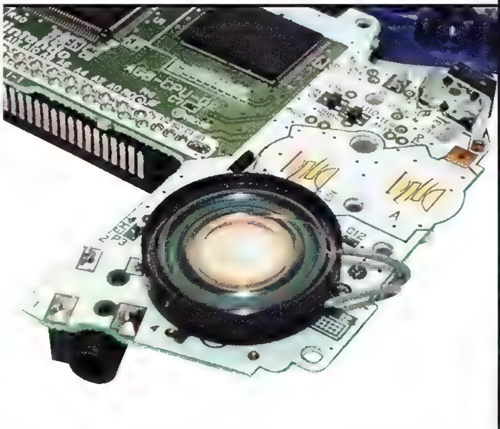
With 511 colours onscreen at once from a colour palette of 32,768, stereo sound that's far better than any previous Game Boy could manage, respectable running time from ordinary batteries and a huge library of existing games, the GBA's leaping off the shelves. This little handheld has about 60% of the resolution of the SNES (the top SNES resolution is 512 x 448, but most SNES games use the 256 x 256 mode), packed into a 2.9in screen!

But what does the GBA use to work its magic?

TAKING IT APART

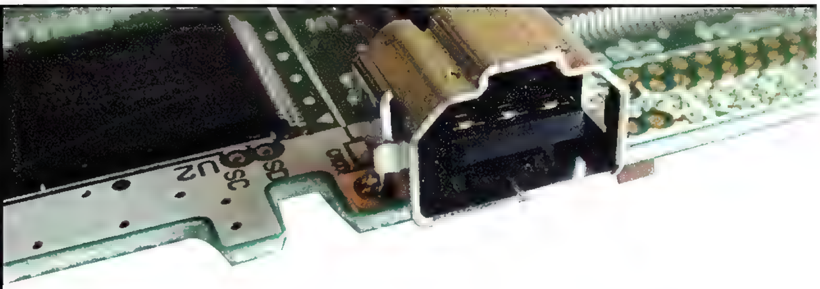


Our first stage in disassembling. With the back of the GBA case removed, you can see the headphone socket and volume control to the left, the battery bay and the chunky cartridge connector in the middle, and the LCD power supply components to the right.



The built-in speaker is this tiny, mylar dome unit (it's 23mm in diameter), which sounds about as lousy as you'd expect. Power-saving and space considerations effectively rule out anything with more audio grunt.

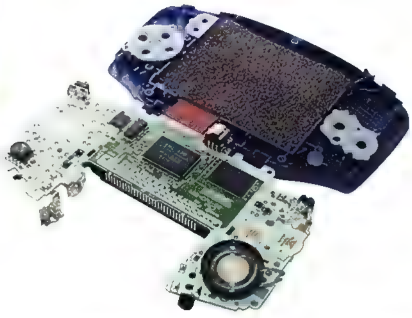
Fortunately, the headphone socket provides stereo output.



The Game Link Port lets you connect up to four GBAs to each other for multiplayer gaming. Some multiplayer games can be played with only one cartridge; the other GBAs load the game through the link cable's 115,200-bit per second serial link.

If you're playing Game Boy or Game Boy Color titles that support multiplayer action, you can use the Link Port for that, too – the GBA can be connected to the earlier model Game Boys as well.

Nintendo also promises that when its Gamecube console hits the streets, you'll be able to connect the GBA to it as a 'smart controller'. This isn't a new idea; Sega did it first with its Visual Memory Unit (VMU) for the Dreamcast. The GBA is a great deal more powerful than the VMU, though.



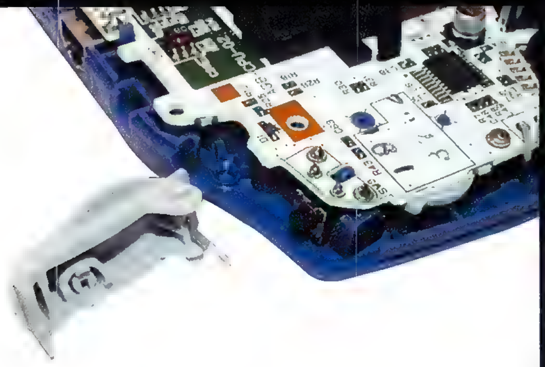
The GBA opens like a clam. The screen connects to the main circuit board with a thin ribbon cable. The foam rectangle cushions the back of the screen, and like all liquid crystal displays (LCDs), this screen is built on a thin pane of glass.

The layout of the PCB will likely change as manufacturing efficiencies improve.

BATTERY LIFE

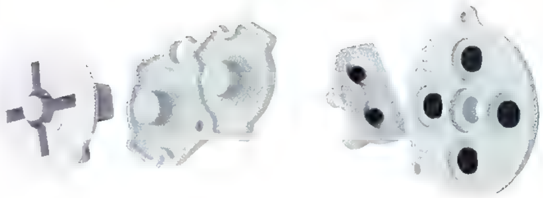
The GBA should run for about 15 hours on two AA alkaline cells, if there's no external light plugged into it. Nintendo recommends against using Nickel Cadmium (NiCd) or Nickel Metal Hydride (NiMH) rechargeable AAs, but they seem to work fine. In any case, 1,500 milliamp-hour (mAh) NiMH cells are now commonly available, and should give about ten hours of running time per charge. The GBA uses *more* power when it's running games for older model Game Boys.

CONTROLS



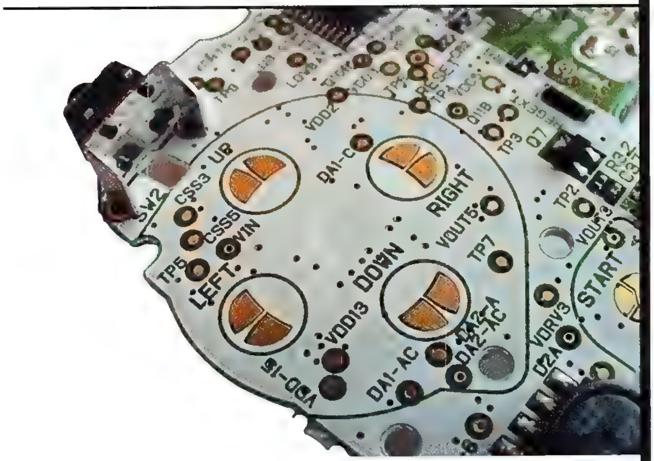
The GBA has two more buttons than previous Game Boys. The extra two are the left and right 'shoulder' buttons, which fall under your index fingers when you hold the GBA. They use a spring-and-microswitch design, and like the other buttons, they're not pressure sensitive. The GBA has no analog controls; everything's plain digital on or off.

If you're playing a Game Boy Color game, the shoulder buttons control whether the game displays with a blank border in its original 160 x 144 resolution, or stretches to fill the entire screen.

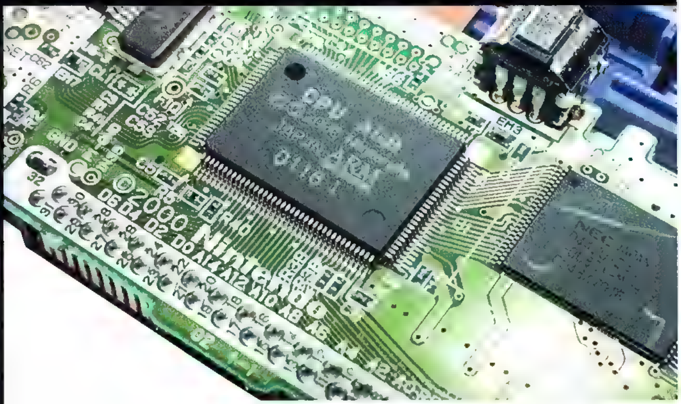


All of the other buttons – the four-way D-pad, the A and B buttons and the little Start and Select controls – use standard carbon-contact, rubber dome design. This type of switch shows up in many current keyboards, and in remote controls as well. If it's got rubbery buttons, it's using dome switches.

The GBA's major controls all have plastic caps, but there's rubber underneath. Every button pushes down on a rubber dome with a black, conductive contact pad in the top of it, and the pad bridges contacts on the circuit board underneath. It's a simple, cheap and quite reliable design.

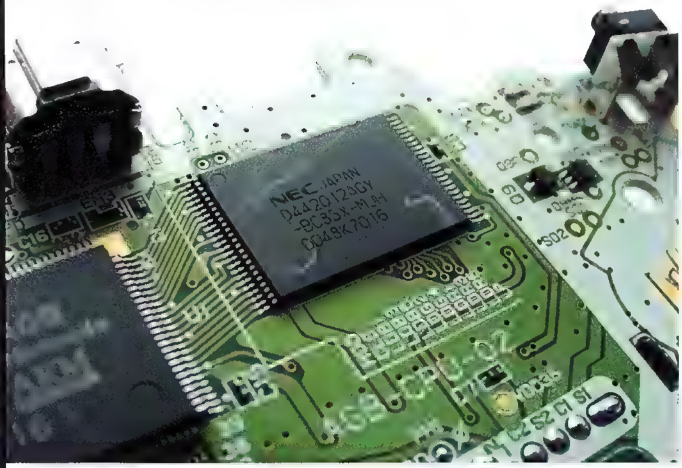


CPU



The Game Boy Advance CPU. It's two chips in one!

When you play a GBA game, you're playing it on a 32-bit ARM7TDMI core, running at 16.78MHz with 32KB of on-die general-purpose memory built in, plus 96KB of dedicated video memory.



There's another 256KB of memory separate from the CPU.

The ARM7 processor is far faster than anything that's been used by a handheld game before, but it's a great deal slower than the processors in Pocket PCs – some of which also use the ARM7 core, but run at a much higher clock speed.

Of course, Pocket PCs don't run on two AA batteries. Not for long, anyway.

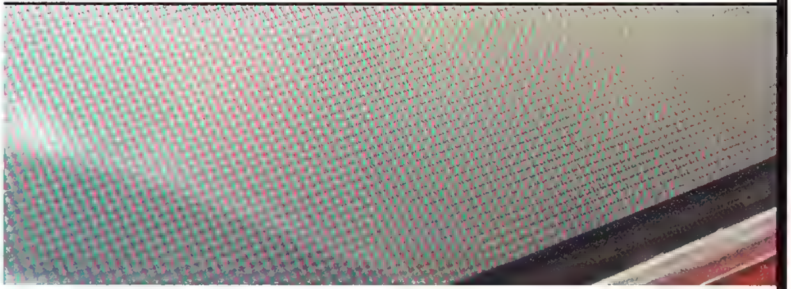
Nintendo has addressed the backward-compatibility issue in the GBA in much the same way that Sony addressed it in the PlayStation2. To let the PS/2 run original PlayStation games without using software emulation, there's a single chip in it that does pretty much all of the processing that the PlayStation did. The rest of the hardware just goes to sleep when you play a PlayStation game on a PS/2.

The earlier Game Boys all have a mutated Z80 CPU, and so does the GBA. The Z80 core is built into the CPU, along with the ARM7 one. Neither CPU has a very impressive transistor count, by PC processor standards. The old Z80 is an 8,500 transistor core, and the ARM7's reduced instruction set computer (RISC) design means that the core needs only 36,000. As a comparison, the new Palomino version of the AMD Athlon CPU has a whopping 37.5 million transistors.

DISPLAY

The resolution of the GBA's small 40.8 x 61.2mm screen is 240 x 160 pixels. The earlier Game Boys only managed 160 x 144.

The GBA's screen is an active matrix LCD. A thin liquid crystal layer sandwiched between crossed polarisers will, normally, 'twist' the polarisation of light passing through it, so that the two polarisers let light through, despite being set up in opposition to each other. If you apply electricity to the liquid crystal layer, its structure changes and it untwists – now the crossed polarisers look black, because the light that passes through one polariser can't pass through the other.



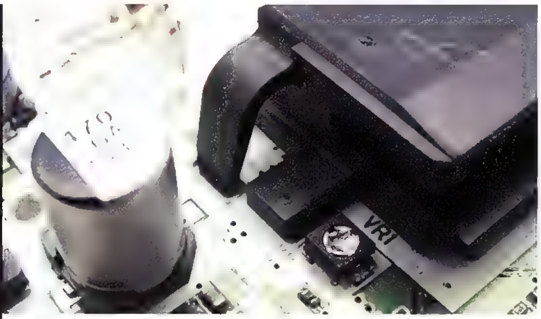
Every pixel on a colour LCD is made up of three 'subpixels', which are so small that you can only barely see them with the naked eye. The subpixels are each a tiny LCD-and-polariser sandwich with a red, green or blue filter on it, and they're arranged in sequential stripes. Each subpixel on an active matrix screen has its own transistor behind it, which controls how dark it is. By changing the amount of red, green and blue each pixel gets, you change the colour of the pixel. But the only thing you can control in an LCD is how dark each pixel is. The subpixels emit no light of their own. They can only change from pretty much black to reasonably clear, in each of the three colours. There has to be some light coming from somewhere else, or you won't be able to see anything.

For this reason, almost all of the world's active matrix LCD screens are backlit (there's a white light behind them), making them glow in the same way as a stained glass window does. It's not the window that does the glowing. The GBA doesn't have a backlight, though, because Nintendo decided that it would cost too much and/or have too serious an impact on battery life. Nintendo did make one backlit model of the Game Boy, the 'Game Boy Light', but the company only ever sold it in Japan. All of the other Game Boys right back to the original have 'reflective' LCD screens. In a reflective LCD, all of the light that passes through it has to come from the outside world, pass through the screen one way, then bounce off a mirror on the back and come back out again. Unfortunately, you lose a lot of the light that way.

Nintendo firmly insists that the GBA's screen looks far better than any previous Game Boy's. Users beg to differ. The GBA has more resolution and more colours, and its screen is bigger. But it is NOT easy to use in anything other than bright light, unless you buy a lighting gadget.

The GBA screen is more angle-sensitive than the Game Boy Color's. The angle of the lighting, and the viewing angle, both have a big effect on whether you can see it properly. In sunlight, it's not a problem. Indoors, it is.

Fortunately, there are already various after-market light accessories for the GBA, almost all of which draw power from the Game Link Port. Since the port is the same shape as the one on the Game Boy Color and Pocket PC, you can plug in lights that worked on them. But if you do, you'll discover that when you're playing GBA games, the power supply rail to the Link Port only delivers 3.3V. The older Game Boys have a 5V power output. This means that you're likely to get only about one-third of the brightness you expect, from a light not made for the GBA. If you plug in an older Game Boy cartridge, the Link Port runs at 5V again, and your light will brighten up.

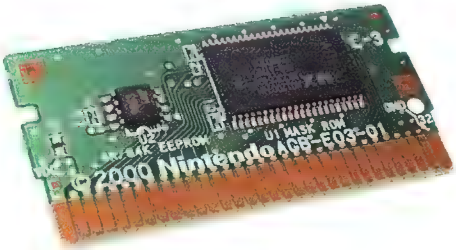


The little silvery cross-shaped thing in this picture is the only adjustable component on the GBA circuit board. You can access it without opening the case – there's a hole in the case that lets you turn it with a small screwdriver. The hole's covered by the label on the back of the GBA, though.

Users discovered, soon after the GBA's release, that you could use this control to change the screen contrast. It is NOT actually a contrast control, though; it's a flicker-reduction control that ensures there's no overall DC bias to the AC voltage that drives the LCD. It's very important that the average drive power for every subpixel on an LCD works out at zero, over time.

Fiddling with the bias control can indeed make some games look a bit brighter, but it can also make them flicker abominably. More importantly, if you change the setting, you're probably applying DC to your GBA's screen pixels, which will slowly damage the liquid crystal fluid and can leave you with a busted toy. In other words, there's a sticker over the adjustment hole for a reason.

CARTRIDGES



The GBA works with cartridges – or, in Nintendo-speak, 'Game Paks' – for every variety of Game Boy. It doesn't add much to the older games, but it runs them just fine. Some Game Boy Color games come out rather dark on the GBA screen; newer ones can detect the GBA and adjust their palette to better match its screen behaviour.

The GBA Game Pak uses the same connector as the other Game Boy flavours – it has to, for the GBA's backward compatibility to work. The top of a GBA Game Pak sits flush with the top of the GBA; older Game Paks stick out at the top of the new Game Boy. There's no 'region locking in the GBA, so Game Paks purchased anywhere in the world will work with a GBA purchased anywhere else. ▢

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Meltdown

Bennett Ring benchmarks more heatsinks than you can throw a CPU at.

Without a decent heatsink and fan on your computer's processor, the chances of getting a sizeable overclock out of your CPU are dramatically reduced and the chances of random crashes and lockups are dramatically increased. Owners of Intel chips don't need to worry as much about CPU heat, as they run relatively cool when compared to AMD CPUs. Getting rid of the large amounts of heat AMD CPUs produce is crucial. The high-end Athlons can pump out more than 70W of heat, which requires some hefty cooling to stop the CPU doing a permanent impersonation of The Blob.

Over the last couple of years, particularly since the steamy Socket A Athlons hit the scene, a plethora of different heatsink designs have promised to cool your CPU better than ever before. Due to the similar design of AMD Socket A and Intel FC-PGA CPU sockets, most of these HSFs are suitable for both chips. Unfortunately, its difficult to tell how well a certain HSF performs until you've laid down your dollars and actually installed the unit.

How we tested

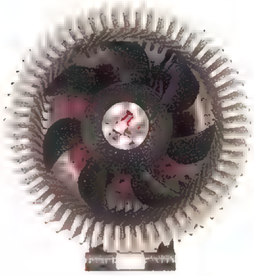
We gathered together every Socket A/FC-PGA HSF that is commonly available in Australia and pitted them against each other. We chose to test using an Athlon 1GHz CPU, as these chips pump out quite a lot of heat and are very popular. However, unlike Intel CPUs, these chips don't have an inbuilt temperature probe so we used a motherboard with a temperature probe mounted in the centre of the socket, touching the underside of the CPU. We used the MSI K7T Turbo-R Limited Edition motherboard, as it has a temperature probe protruding from the centre of the socket. It also has fewer capacitors around the socket, allowing us to test a wider range of HSFs.

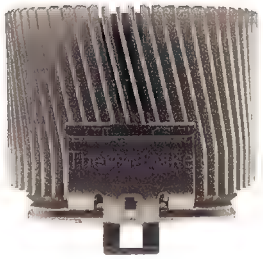
All heatsinks had the thermal compound cleaned from the base (if it was present), and a fine layer of Arctic Silver thermal paste was applied. We then ran the Sandra CPU burn-in mode for 30 minutes before measuring the temperature with MSI temperature monitoring software. This was recorded as the 'under load' temperature. It was then left to idle for another 30 minutes before the idle temperature was measured. Each HSF was tested with the default fan in place, while those that didn't come with fans had a 6,800rpm fan attached. Fan speeds were measured using the MSI monitoring software.

We also gave each HSF a rating out of 10 for ease of installation and noise. Finally, each HSF was weighed with a fan in place. The motherboard was set up on a bench, out of a case, in an air-conditioned room with a constant temperature of 20°C. We also recorded the maximum AMD processor speed supported by each HSF. Every heatsink fan tested can handle the top-speed Pentium IIIs.

The heatsinks we reviewed were kindly supplied by AusPC Market (www.auspcmarket.com.au), Cool PC (www.coolpc.com.au) and Below Zero (www.below-0.com).

Thermaltake Mini Copper Orb





Clip: 8/10
RPM: 5,800
Idle temperature: 37°C
Load temperature: 43°C
Noise: 8/10
Price: $43
Weight: 370g
Suitability: Up to AMD 1.5GHz

When it comes to heatsinks, most people assume that if it is constructed largely of copper, it will kick major butt. After testing this heatsink, we can safely say that this assumption is totally untrue.

This cooler uses the Orb design that Thermaltake is so famous for using, but has a large copper slug in the centre of the unit. This goes all the way through to the base of the unit, so the CPU core is actually in contact with the copper. A 5,800rpm fan keeps the noise levels down, but performance obviously suffers as a result.

When idling, this cooler keeps the CPU nice and cold, but when the CPU is doing anything, temperatures begin to soar. In fact this cooler was one of the worst performers, which is very surprising considering the copper construction.

Considering its weight, price and performance, we can't recommend this cooler when there are better coolers out there.

Crunchy cores

In the course of bringing this article to you, we sacrificed a 1GHz Athlon CPU along the way. Constantly changing HSFs turned out to be a little too much for our test system CPU, but after a brief period of mourning a replacement chip was sourced. This necessitated re-testing the HSFs that had already been tested, as the new CPU ran substantially cooler than the one we smashed into little fragments (actually, only one corner had a tiny chip, but that was enough to kill it). So what's the moral of this story? Make sure you have the HSF perfectly level on your CPU while you clip it in place. Totally and utterly 100% level. L-E-V-E-L. Got it? If you don't, you'll very likely chip the side of the CPU core that the HSF clip is on. Try to use a HSF with a decent clip if you plan on removing it often.

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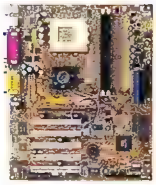
AMD 1.4GHz Athlon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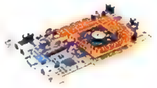
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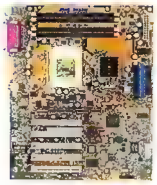
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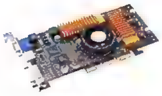
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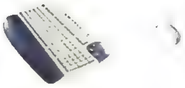
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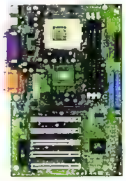
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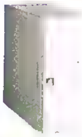
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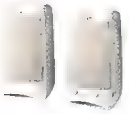
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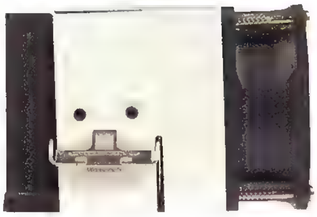
Alpha PAL6035



Clip: 6/10
Idle temperature: 35°C
Load temperature: 39°C
Noise: 7/10
Price: $60
Weight: 350g
Suitability: Information not available

The Alpha PAL6035 was one of the first HSF units to hit the overclocking scene that incorporated a copper slug within its core. At the time of release, it received widespread acclaim for being the best cooler available for Socket CPUs. That was over a year ago, so how does it stack up against today's high-tech beasts? Not too well, if our results are anything to go by.

Both load and idle temperatures were definitely middle-of-the-road when compared to the rest of the HSFs. This is surprising considering the unit's copper core and high-quality workmanship. To make matters worse, the clip is one of the worst that we tested, being extremely difficult to clip into place.

Thankfully these coolers aren't quite as expensive as they used to be, which was over $100. However, when compared to the rest of the pack, the Alpha shows its age, and as a result we can't recommend it.

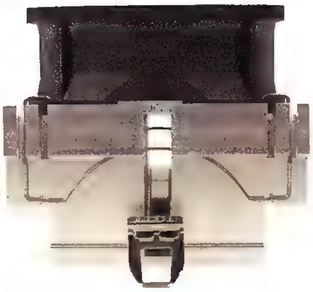
Cooler Master CS-CMDP56H51

Clip: 8/10
RPM: 4,800
Idle temperature: 37°C
Load temperature: 42°C
Noise: 8/10
Price: $22
Weight: 188g
Suitability: Up to AMD 1.2GHz

This heatsink is one of the smallest heatsinks in the round-up, so it might be the one for those with an extremely crowded CPU socket. It's officially recommended by AMD for the Athlon CPU, but this doesn't mean that it is automatically one of the better heatsinks to get.

As our recorded temperatures show, this HSF is by no means a high-performance unit. This isn't really surprising given the aluminium construction, small size and low-speed fan. However, it is one of the least expensive HSFs we tested and it isn't anywhere near as loud as the better performers. A highlight of this HSF is the easy-to-use clip – a helpful feature after you've attached and detached 20 heatsinks with a dead Athlon along the way. Rated to handle anything up to a 1.2GHz Athlon, this could be the perfect HSF for those on a budget who aren't too concerned about overclocking.

GlobalWIN FOP 32-1



Clip: 6.5/10
RPM: 4,200
Idle temperature: 35°C
Load temperature: 40°C
Noise: 9/10
Price: $35
Weight: 190g
Suitability: 1.33GHz

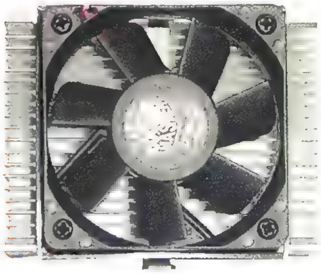
This GlobalWIN FOP 32-1 cooler is the quieter version of the infamous FOP-38, the cooler otherwise known as 'the turbine from hell'. It uses an identical base to the FOP-38, but a much slower 4,200rpm fan in place of the 6,800rpm screamer that the FOP-38 uses. As a result it's a much quieter model than the FOP-38. This is just one reason why it was the cooler of choice in the Atomic Labs.

The FOP 32-1 uses the standard GlobalWIN clips, which aren't exactly the strongest clips around. Neither are they the simplest to detach and reattach.

It's obvious that GlobalWIN knows how to make a high-quality heatsink, as even with the slower speed fan this cooler posted some respectable temperatures.

At only $35 the FOP 32-1 is one of the cheapest coolers in the round-up, and is most suitable for those who desire low noise levels without totally sacrificing performance. It may not be the most attractive design around, but like most GlobalWIN heatsinks, it does the job well.

Cooler Master CS-CMEP56151



Clip: 6/10
RPM: 4,800
Idle temperature: 35°C
Load temperature: 38°C
Noise: 9/10
Price: $35
Weight: 265g
Suitability: Up to AMD 1.4GHz

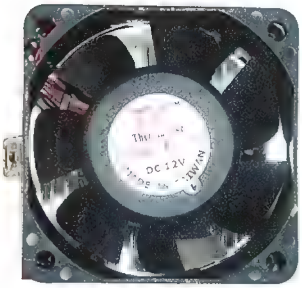
Being one of the larger units we tested, the Cooler Master CS-CMEP56151 probably won't be suitable for those with cluttered CPU sockets. This is a real pity, as these people will be missing out on an excellent cooling unit.

At only $35, this cooler isn't priced like a high performer. The plain rectangular aluminium construction doesn't offer any clues as to how well this unit keeps your CPU cool, with the exception of its large footprint.

However, as our temperatures show, this HSF was one of the best performers in our tests, coming in at only 3C hotter than the leader. For such a low priced HSF this is quite amazing.

Even more astounding is the noise level of this cooler. The low speed fan makes it the second quietest HSF we tested, beaten only by the whisper quiet Volcano II. Considering how quiet this unit is, we're blown away by how cool it keeps things. The only drawback of this cooler is the clip, being the hardest to remove of all units tested.

Thermaltake Volcano II



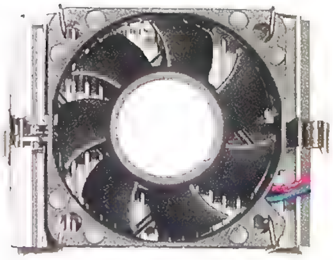
Clip: 8/10
RPM: 4,600
Idle temperature: 36°C
Load temperature: 42°C
Noise: 9/10
Price: $36
Weight: 215g
Suitability: Up to AMD 1.5GHz

Unlike the other Thermaltake HSFs in this round-up, the Volcano II uses a traditional rectangular design. It is a simple aluminium construction, with a low price as a result, and looks about as plain as a heatsink can get.

The Volcano II's performance levels weren't anything to get excited about. At 42°C under load, it was over 7°C hotter than our lead performer. It's supposedly rated to handle a 1.5GHz Athlon, but we're doubtful that it could handle such a toasty CPU for extended periods of time.

But things aren't all bad for this HSF. It has one of the easier clips to remove, and is easily one of the quietest HSF that we've had the pleasure of not hearing. After the high-pitched vacuum-cleaner-on-steroids whine emitted by some of the higher performance units, the Volcano II's total lack of noise was music to our ears. If you have to sleep in the same room as your PC, this HSF won't keep you up all night.

GlobalWIN FNP-50



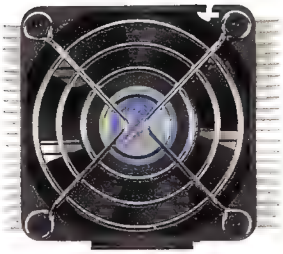
Clip: 7/10
RPM: 6,700
Idle temperature: 38C
Load temperature: 44C
Noise: 9/10
Price: $30
Weight: 155g
Suitability: Up to AMD 1.2GHz

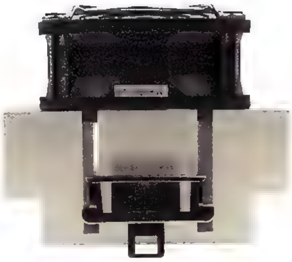
This heatsink is by far the smallest of all of those we tested. It is almost half the width of some of the larger HSFs, so it could be a great unit for those with very cluttered CPU sockets. It is also easily the quietest unit we tested, even though the fan spins at a high speed of 6,700rpm.

It has the same clip as most GlobalWIN HSFs, which have proven in the past to be quite easy to snap. It is a very tight fit – in fact, the FNP-50 is the heatsink responsible for eating our original 1GHz Athlon reference system.

After replacing our CPU, we weren't too surprised to see that this cooler is a poor performer, coming in towards the tail end of the pack. But if you're running anything from a 1.2GHz Athlon or below and want a cheap, ultra-quiet heatsink, this could be the one for you.

Vantec HSF





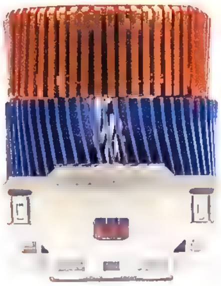
Clip: 9/10
RPM: 6,500
Idle temperature: 34°C
Load temperature: 38°C
Noise: 7/10
Price: $33
Weight: 250g
Suitability: Information not available

In case you didn't know, Vantec is 'The Thermal Solution Leader – well, that's what the Web site claims. To be honest, we'd never heard of this brand before this round-up. But that didn't stop the Vantec HSF we tested from coming in towards the head of the pack. Constructed of aluminium alloy, this HSF design uses a standard rectangular design.

This HSF is quite wide, so owners of motherboards with lots of capacitors around the socket might need to check that it will fit. The simple clip design was extremely easy to attach and detach from the socket, and the unit tested had a 6,500rpm fan attached. This high-speed fan wasn't the quietest of the bunch, but it was by no means the loudest.

At only $33, this heatsink is excellent value for money, and proves that sometimes the simple ideas work the best.

Thermaltake Dragon Orb 3



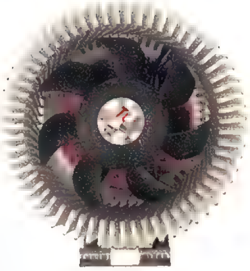
Clip: 6.5/10
RPM: 6,300
Idle temperature: 33°C
Load temperature: 37°C
Noise: 6/10
Price: $47
Weight: 650g
Suitability: AMD 1.5GHz and above

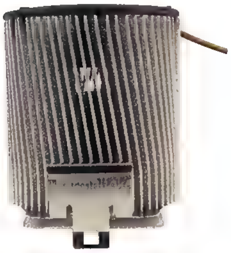
The Dragon Orb 3 is the 'latest and greatest' cooler from Thermaltake. It is basically an enhanced Mini Copper Orb with an extra copper cooler strapped to the top. This extra copper top section is also sold separately as an upgrade to existing Thermaltake Orb coolers. It must be noted that the extra copper on top is very flimsy, and will no doubt end up looking the worse for wear after a couple of removals.

This cooler is built primarily of copper, with a large central copper slug surrounded by aluminium alloy fins. As a result it is the heaviest HSF in the group, weighing in at a massive 650g. You will need to ensure that your motherboard can handle this kind of weight if you're thinking of purchasing the Dragon Orb 3.

The clip mechanism has been redesigned from the other Orbs, but it still isn't good enough when compared to the competition. The heavy weight combined with the stiff clips make this HSF a very capable core crusher. The high-speed fan that this unit ships with also makes it one of the louder HSFs, but the Dragon Orb 3 turned out to be one of the best performers. If you overlook the difficult clip and loud noise, this HSF unit offers great performance and value for money.

Thermaltake Mini Super Orb





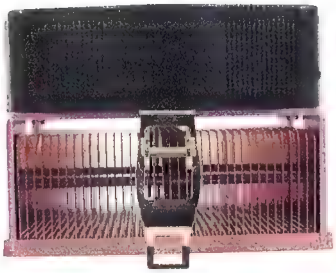
Clip: 6/10
Idle temperature: 37°C
Load temperature: 42°C
Noise: 7/10
Price: $45
Weight: 260g
Suitability: Up to AMD 1.5GHz

We're not sure what Thermaltake thinks the word 'mini' means, as the Mini Super Orb is only a fraction smaller than the Super Orb. In fact, it only weighs 15g less, making it clear that this cooler isn't quite as 'mini' as Thermaltake would have you believe. However, the slight shrink in size makes it possible to fit this unit to ABIT motherboards.

Other than the slightly smaller size, this HSF is basically identical to its big brother. As such it still utilises the same cylindrical tower heatsink with two fans. Unfortunately, it also has the same annoying and difficult to remove clip that most of the Orb coolers have.

Considering that this is a shrunken Super Orb, you'd expect it to perform slightly worse than the Super Orb. But our tests tell a different tale, with the Mini testing a couple of degrees cooler than the Super Orb. Unfortunately, this performance increase isn't enough to help the Mini Super Orb compete with most of the other coolers in our round-up.

PowerCooler PCH137

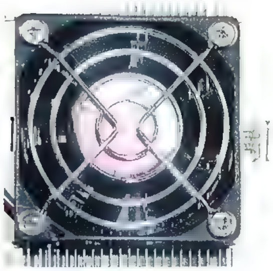


Clip: 10/10
RPM: 5,000
Idle d temperature: 35°C
Load temperature: 39°C
Noise: 8/10
Price: $60
Weight: 360g
Suitability: Information not available

The PowerCooler PCH137 was the first all-copper HSF we looked at, so naturally our expectations were high before testing began. The model we tested comes with a low-speed 5000rpm fan, which helped to keep this cooler fairly quiet. This fan could be the reason why the PCH137 didn't do too well in the tests. With a load temperature of 39°C and an idle temperature of 35°C, this unit didn't live up to our expectations, reinforcing our belief that fan speed is much more important than the material the heatsink is made of. We're sure that if this base was shipped with a higher speed fan it could have performed up there with the best of those tested.

A highlight of this HSF was the brilliant clip. It was so simple to use that even a child could do it, which is useful considering the weight of the unit. There's no denying that this copper heatsink looks cool, but the price and weight seem to outweigh its mediocre performance.

GlobalWIN WBK38



Clip: 7/10
RPM: 6,400
Idle temperature: 32°C
Load temperature: 35°C
Noise: 7/10
Price: $45
Weight: 290g
Suitability: Up to AMD 1.4GHz

Just when we thought we had a clear winner in the SK6, along came GlobalWIN's WBK38 to show us that you don't need to use expensive, heavy copper to create a winning heatsink. The WBK38 is a large chunk of aluminium alloy that looks fairly plain, if somewhat large, making it unsuitable for some motherboards. It has an average clip that wasn't the easiest nor the hardest to remove, and its 6,400rpm fan is surprisingly quiet. At $45 it sits in the middle of the pack in terms of cost, but its performance figures definitely aren't middle of the road.

In the under load test the WBK38 recorded 35C, making the WBK38 equal first with the SK6. Its temperature of 32C whilst idling was only 1C hotter than the SK6, giving it the second lowest temperature for this test. This all comes at the low price of $45, and it's also a much lighter heatsink than the SK6. For these reasons we have to declare the WBK38 as the best heatsink that we tested. Its brilliant performance combined with the wallet-friendly price makes it a bargain too good to miss.

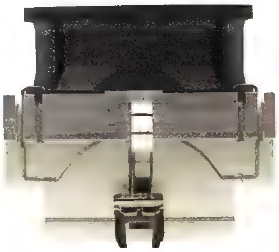
Thermaltake Super Orb

Clip: 6/10
Idle temperature: 39°C
Load temperature: 44°C
Noise: 7/10
Price: $45
Weight: 275g
Suitability: Up to AMD 1.5GHz

Thermaltake has developed a reputation as a manufacturer of quality HSFs, mostly due to its Orb line of coolers. The Super Orb takes the Orb design one step further, stretching the round heatsink vertically and adding another fan at the top of the unit for a total of two fans in the one heatsink.Considering that the Super Orb has two fans, it's surprisingly quiet. When the Super Orb was first introduced, its clip design was much better than the majority of its competitors. However, this is no longer the case. We found the Super Orb to be one of the harder units to attach and detach of all of the units we saw. The height of the Super Orb also makes it easier to try to attach the HSF while it is at an angle, and we know of several people who have crushed their Athlon cores as a result.

Considering its size and use of two fans, the Super Orb didn't perform especially well. Actually, it proved to be one of the worst coolers we tested. Its large size also makes it unsuitable for many motherboards, especially those made by ABIT.

GlobalWIN FOP-38



Clip: 6.5/10
RPM: 6,800
Idle temperature: 33°C
Load temperature: 38°C
Noise: 6/10
Price: $47
Weight: 220g
Suitability: Up to AMD 1.4GHz

Ask any overclocker what they think of the FOP-38 and the reply will most likely be 'bloody awesome, bloody loud'. These HSF units have quickly established a reputation over the last nine months as one of the HSF units to have. At the same time, they've developed a reputation for being incredibly loud to the point of causing ears to bleed!

The noise, and high performance, is delivered courtesy of a 6,800rpm fan. Trust us, you haven't heard a loud HSF until you've fired up the fan on the FOP-38. We replaced the FOP-38 with the FOP 32-1 as our default Labs cooler for this very reason. The actual heatsink is a standard aluminium alloy rectangular block, with GlobalWIN's annoying clip design in place.

For such a simple design, the FOP-38 performs very well, scoring some of the lowest temperatures of all of the HSFs tested.

ThermoSonic V60-4210 ThermoEngine

Clip: 7/10
RPM: 7,100
Idle temperature: 33°C
Load temperature: 37°C
Noise: 5/10
Price: $55
Weight: 290g
Suitability: Up to AMD 1.5GHz

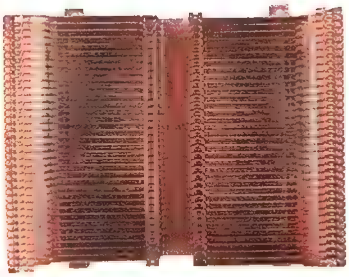
First impressions of the ThermoEngine are that this is one sexy HSF unit. Something about the all-black, perfectly square heatsink and its smooth lines simply reek of quality and style. In the few months that this HSF has been around, it has also created quite a stir due to its impressive performance.

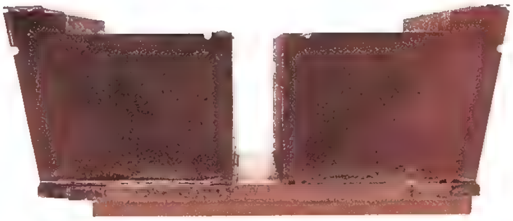
This HSF had the fastest fan of all of the units we tested, with a speed of 7,100rpm. This fan also made it the loudest HSF in the round-up, exceeding even the FOP-38 with its ability to make your head hurt.

The ThermoEngine features one of the better clips we saw, so you shouldn't have to worry about crunching your core with this one. When it comes to performance, the ThermoEngine is a beast. As our results show, it was one of the best performers in the entire round-up.

It isn't the cheapest HSF around, however it does offer amazing performance while still managing to look great. If appearances are important to you and you can handle the noise, grab yourself one of these impressive coolers.

ThermalRight SK6





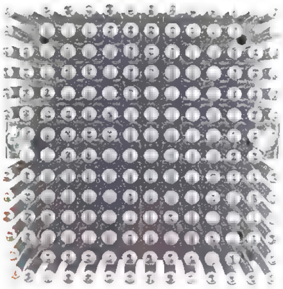
Clip: 8/10
RPM: 6,800
Idle temperature: 31°C
Load temperature: 35°C
Noise: 6.5/10
Price: $129
Weight: 420g
Suitability: AMD 1.33GHz and above

After the disappointing performance of the all-copper PowerCooler PCH137, we weren't expecting great things from the SK6. The SK6 is another all-copper beast that weighs enough to work out with. We're a little worried about the stress these behemoths can place on a motherboard when mounted vertically, but it shouldn't be a problem for most.

Copper coolers also have something else in common other than their weight – their price. At $129 with a 6,800rpm fan, this is easily the most expensive HSF we tested. That amount of money can buy you a cheap water cooling setup if you're prepared to do a DIY job.

The SK6 performed the way we expect a copper heatsink to perform. In a word, brilliantly. It came equal first for lowest temperature while under load at 35°C, and first for the lowest temperature when idling at 31°C. These temperatures allow plenty of headroom for cranking things up to 1.5GHz and above. To make it even more attractive, the clip made detaching and attaching the heatsink a total breeze. If you can afford the high asking price, you won't be disappointed with the SK6.

E-CompuVision CVChill



Clip: 9/10
RPM: 6,800
Idle temperature: 44°C
Load temperature: 52°C
Noise: 6.5/10
Price: $92
Weight: 332g
Suitability: Information not available

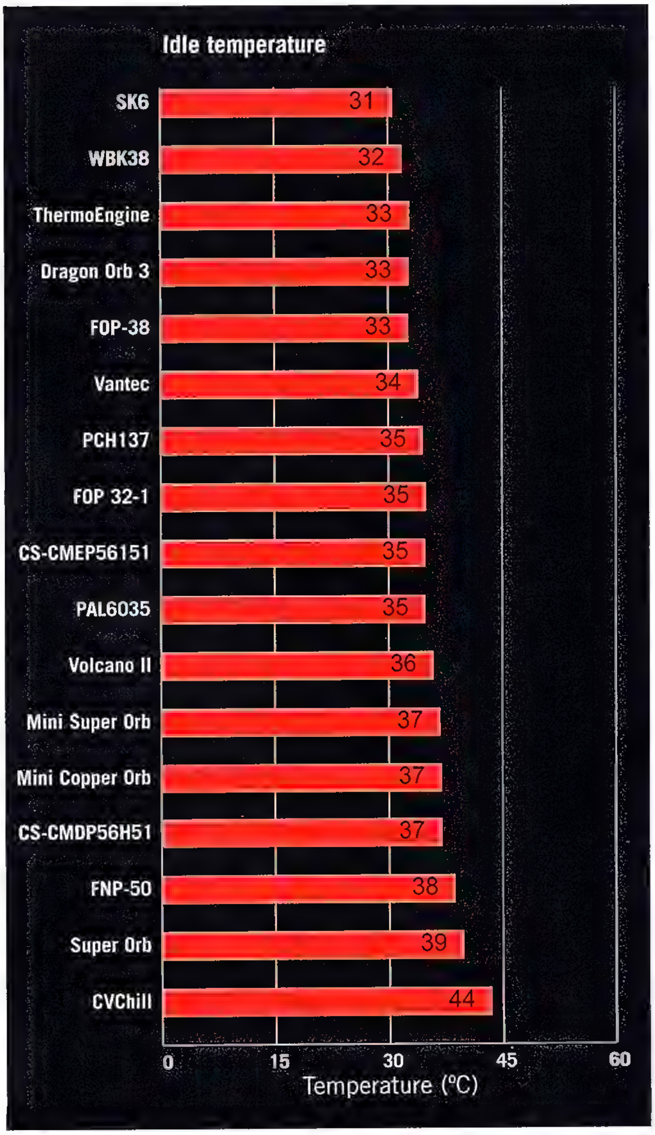
This HSF sports the most bizarre clipping mechanism we've seen. It is the only clip that doesn't require the use of any force, thus removing any risk of chipping the CPU. Or so we thought until our Athlon snapped in half with this HSF attached.

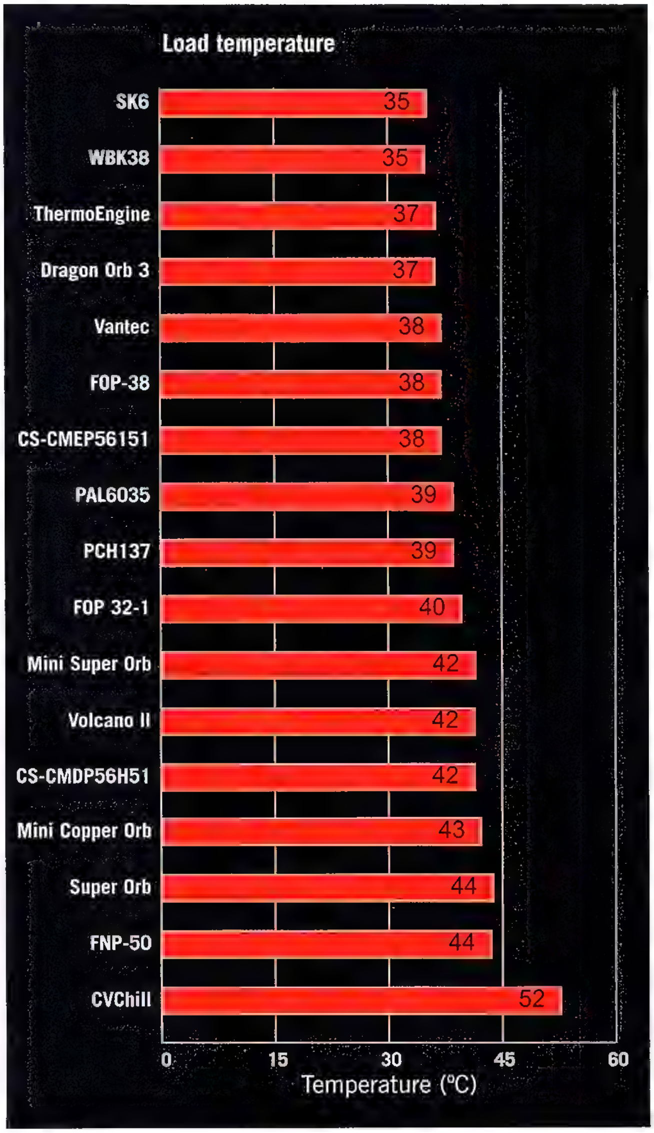
We strapped a 6,800rpm fan to the heatsink before firing up the Sandra CPU burn-in tests. The results were thoroughly underwhelming. This cooler easily comes first in overall CrapMarks™.

The four laws of heatsinks

The first law is that a high-speed fan, while usually noisy, is the best way to achieve maximum cooling. The second is that size matters. Generally speaking, the bigger the heatsink, the better it will cool. Also, you don't always pay for what you get. While the $130 SK6 performed admirably, the WBK38 at half the price performed just as well.

Finally, when attaching the heatsink, make sure it is perfectly level. The feeling of loss experienced when you destroy a $250 chip in seconds is a feeling best avoided.





BALL GRIP

At atomic, nothing escapes the ever-present urge to benchmark. After the daily round of coffee mug testing, John Gillooly set his sights on the humble mousepad.

We all use mousepads. In fact, they receive some of the heaviest treatment of any part of your PC. Besides copping a heavy amount of scraping, scratching and thumping with the mouse, they are also prime targets for the pools of beer, soft drink and coffee that inevitably get spilled around all that precious electronic equipment. Add sweat, the occasional bit of blood and other things like ash and crumbs, and you have something much more than a surface to sit your mouse on; you have a potential breeding ground for all sorts of nasties.

Above all, the pad has to have the right feel for gaming or when ploughing through the day-to-day desktop grind. There are plenty of mousepads around. And the vast majority are those foam dust traps – the only kind that were available a few years ago – that no-one seems to want to replace, no matter how torn and greasy they become. These are slowly being supplanted by a new generation of thin, rough, plastic pads. In addition, specialised mousepads have begun gradually appearing, following the lead of perennial favourite, EverGlide.

There has been minimal technological development in the world of the mousepad, with only a few companies actually looking to develop better surfaces. This is not because, like the mouse trap, the current design is perfect. It's just that for some bizarre reason the mousepad is not seen as 'high tech', with the majority of IT companies preferring to concentrate on the more 'sophisticated' aspects of computing such as video cards and motherboards.

'The first new atomic test has been dubbed 'TouchyFeelyMarks' (TFM), an objective assessment of the tactile responsiveness of each of the mouse pads by our expert tactiletician . . .'

The suitability of different pads depends on what you use your PC for. Frankly, all the pads available (apart from those old foam dust traps) are more than suitable for general desktop tasks. But for the precision world of gaming, the right surface can make the difference between ownage and newbification.

Mousepads? We benched 'em

So how on earth do you benchmark a mousepad? This has been the subject of several long debates and sleepless nights in the Atomic Labs, and has lead to a host of new, innovative mousepad benchmarking solutions that will aid in that crucial mousepad purchasing decision.

The first new atomic test has been dubbed 'TouchyFeelyMarks' (TFM), an objective assessment of the tactile responsiveness of each of the mousepads by our expert tactiletician, Ben Mansill. The scores are given out of five; the higher the score, the more sensual the mousepad. Accompanying the tests is expert commentary by atomic staff on each and every surface type.

As a precautionary backup, we decided to test the accuracy of each pad in Quake 3: Arena. We used each mousepad using the statistics-based Quake 3 mod, SHUD (www.planetquake.com/shud), and then output the accuracy results to HTML tables. Each pad was tested in a four-player botmatch on the popular map, q3dm_17. These matches involved three rounds, in which the accuracy results were averaged out. Each test was run twice – once with a standard Microsoft ball mouse, and then with Microsoft's optical IntelliMouse Explorer – in order to see the difference between the two types of mice. Surprisingly, the accuracy results actually tallied closely with our observations of the various benefits of each mousepad. These accuracy results are expressed in percentage terms, based on the total number of rounds fired and then divided by the number of actual hits made. To keep the tests as unbiased as possible, weapons that tend to skew the results by pumping out a lot of rounds (like the machine gun) were avoided. With our rigorous methodology in place, we donned our well-worn lab coats and got down to work.

The usual suspects

For this Head to Head, we gathered together a small assortment of mousepads for testing. These range from generic mousepads that are available at, as they say in the classics, good stores everywhere, and are very similar to the pads that often accompany pre-built computers. For good measure we also threw in one of the latest in ergonomic wrist-rest pads from Belkin, which happens to be one of the better ergonomic pads available.

On the gaming end we have popular mousepad maker EverGlide, with both its old mousing surface and its relatively new V-1 surface, which was introduced earlier this year. Alongside this is relative (in the stagnant mousing world terms) newcomer fUnc Industries, with its fUnc sUrface1030. Last but not least is perhaps the ultimate and most accessible of all the pads, the humble wooden desktop, which has served as a yardstick for our mouse testing. After all, why bother using a mousepad when you can get the same, or better, performance from the humble wooden desk.

THE WOODEN DESK

Renowned for their highly variable surface quality, desks are widely available from a range of manufacturers, and enjoy a healthy second-hand market. All desks smack of over-packaging, with the relatively small mousing surface augmented by a much larger, almost indistinguishable 'desktop' that is usually so big it is measured in terms of square metres. This is mounted upon wooden or metal prongs known as 'legs' that help to raise the mouse surface to the correct height off the ground. The desk is not the most portable of mousepads, with movement to LANs and the like somewhat impractical. Canny LAN organisers have long known the importance of the desktop as a mousing surface and have been providing them for use over the day's festivities for several years now.

To test performance, we used a widely available model, consisting of a particle board surface on metal legs. The surface worked much better with the optical mouse than the ball mouse, as there was a tendency for the ball to lose grip occasionally. Optical mice are best suited to slick, opaque surfaces for the best tracking, and for this reason, the wooden desk is definitely an attractive option for optical mouse fans. Unfortunately, the desk is also the most susceptible to spills, due to the large surface funnelling mess into the mousing area. It is also prone to scars and blemishes that can degrade performance over time.

SUMMARY

SUPPLIER: Furniture stores
PRICE: Variable

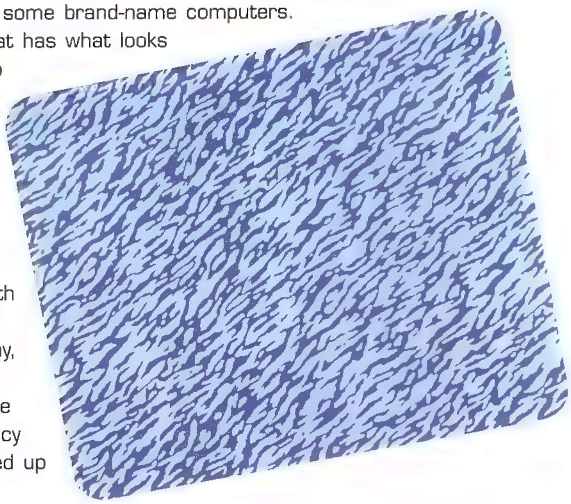
SURFACE TYPE: Particle board
TFM: 2.7
ACCURACY (BALL): 34%
ACCURACY (OPTICAL): 43%
BEN: Better than a slab of wetsuit.
JOHN: It almost makes me not suck at Quake 3.
BENNETT: It gave me splinters.
KATE: Calm down, it's just a desk.

GENERIC MOUSEPADS

A lot of people would remember the good ol' days, where restrictions on OEM software were circumvented by bundling the cheapest and nastiest foam mousepads money could buy. The generic mousepad has come a long way since those dark days, but they are still a part of our existence.

The pads we chose to test occupy two of the major niches. One is a green, thin, plastic mousepad with an adhesive surface that stops it from slipping around – much like those that come with some brand-name computers. The other is a thin, blue pad that has what looks like a moulded plastic backing to stop it slipping around the desk, and a front that looks like a flattened blue Zebra..

Even though both were brand-new pads, after a small amount of testing, both showed a very worrying amount of wear and tear. The major problem with the adhesive-backed pad is that the stickiness quickly wears away, after which the pad absolutely refuses to stay in one place. The plastic-backed pad has a tendency to curl and get its edges messed up very quickly.



SUMMARY

SUPPLIER: Bargain bins everywhere
PRICE: Cheap and variable

CRAPPY BLUE MOUSEPAD
SURFACE: Grippy vinyl
TFM: 3.6
ACCURACY (BALL): 27%
ACCURACY (OPTICAL): 35%
BEN: Low tech, with a good, firm grip.
JOHN: It's like running on sand.
BENNETT: Mousepad? I thought it was a piece of vinyl.
KATE: I lurve the Zebra pattern.

CRAPPY GREEN MOUSEPAD
SURFACE: Sticky margarine-tub plastic
TFM: 2
ACCURACY (BALL): 21%
ACCURACY (OPTICAL): 32%
BEN: This is definitely not a mouse mat, it's a placemat.
JOHN: The mousing equivalent of a car park with an oil spill.
BENNETT: It would make a really great cat flap!
KATE: Oh! It's just like a real one.

BELKIN WAVEREST GEL

This pad represents the cutting edge in squishiness. Incorporating a fabric top, rubber backing and a gel wrist rest, this is not a fantastic pad for hard-core gamers. But it is a very nice pad for those who just want a comfortable place from which they can cruise their desktop.

In the accuracy tests, the pad didn't fare too badly. However, for big-handed people like myself, achieving a comfortable position on the wrist rest means that the mouse almost hangs off the top of the pad. The foam cover means that the pad is susceptible to the wear and tear of the daily grind, with the potential to keep a firm hold of spills for years to come. Definitely a nice mousepad; it's just not great for gaming. On the plus side, the rubber backing means that the pad will not slide around the desk.

SUMMARY

SUPPLIER: Belkin www.belkin.com.au
PRICE: $19.95

SURFACE: Wetsuit-encased breast implant
TFM: 1.7
ACCURACY (BALL): 25%
ACCURACY (OPTICAL): 37%
BEN: Nice hand rest, useless mouse pad. Too squashy.
JOHN: Good for one-handed Web surfing, not gaming.
BENNETT: Where did my RSI go?
KATE: The only sexual one there is.

EVERGLIDE

There are several models of mousepad available from EverGlide, and the distinctly styled, moulded plastic mousepads are a common sight in bedrooms and at LANs everywhere. What few people realise is that EverGlide changed its trademark mousing surface earlier this year. The new V-1 surface is noticeably finer and more even than the old surface, and has a matt appearance as opposed to the slightly glossy surface of the old model.

EverGlide pads come in three main flavours: the OMS (original mousing surface), which is the smallest of all the pads and is only available with the old surface; the Attack Pad, which is oval in shape; and the GIGANTA, a big rectangular pad that provides enough surface area for any mere mortal.

For those who haven't seen them first-hand, the EverGlide pads resemble chopping boards with rounded edges for comfort. They are available in black, blue and white, and thanks to a healthy merchandising relationship with game companies, there are several different game logos that can be emblazoned on the pads. All of the pads are suitable for ball mice, however, the white pads are slightly translucent and do not work properly with optical mice.

The plastic surface of the EverGlide pads also means that they are wonderfully easy to clean. They do have a tendency to accumulate grime, which gets ground into the surface by the action of the mousepads. But they can be easily cleaned using some alcohol or even Armourall, and by keeping the glide pads on your mouse clean.

SUMMARY

SUPPLIER: AusPC Market
www.auspcmarket.com.au
PRICE: $31.90 OMS, $34.10 Attack Pad, $38.50 GIGANTA

OLD SURFACE
SURFACE: Shiny polythene
TFM: 3.7
ACCURACY (BALL): 40%
ACCURACY (OPTICAL): 34%
BEN: Fairly grippery and unpleasantly cold.
JOHN: In fact, it's ball-grippingly good.
BENNETT: More grip than a grippy guy.
KATE: Not as good as the squishy ones.

V-1 SURFACE
SURFACE: Not-so-shiny polythene
TFM: 4.6
ACCURACY (BALL): 32%
ACCURACY (OPTICAL): 37%
BEN: Really, really frictiony.
JOHN: Makes a great loofah as well.
BENNETT: I think it just made love to my mouse.
KATE: My hands are getting sandpapered already.

ANY OLD ISSUES YOU NEED TO DEAL WITH?

Friends can be cruel at times, especially when they are bragging about having the one issue of atomic that you missed. The quick and easy way to put them back in their place is to get your own copy. In the process you will become a more complete atomican. Gotta collect 'em all!

Pentium 4 1.5GHz vs. Athlon 1.2GHz, overclocking AMD processors

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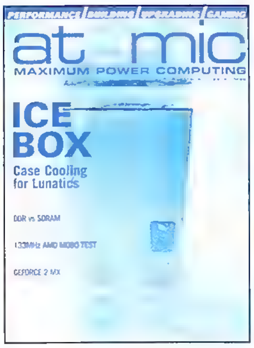
The evolution of 3D, Duron vs. Celeron, overclocking Intel processors



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Issue seven: AthlonMP 2.4GHz Double Grunt vs. Pentium 4sXeon; Eight Card GeForce3 Rumble; securing your system against hack attacks; CPU lapping guide; the unfinished legacy of 3dfx; all about the Athlon 4; the ever-expanding world of distributed computing; the future of war gaming with Operation Flashpoint; the ultimate gaming chair reviewed.

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FUNC SURFACE1030

When we opened the sleek, silver tin that this mousepad comes in, we had the baselines pumping and had been preening our 'Fros for several hours. Unfortunately, we soon realised that the pad was called fUnc and not funk. When the disappointment subsided we took a good look at the pad, called the sUrface1030, and were distinctly impressed.

The sUrface1030 is actually two mousepads in one. One side of the pad is smooth; the other is slightly rougher. The actual pad mounts in a black rubber holder that stops it from slipping around as you engage in some fragging. Also supplied with the tin is a small metal clip that attaches to the rubber base to hold the mouse cord. This prevents annoying tangles and saves you having to invest in any of the 'mouse bungie' devices on the market.

To put it simply, the performance of this mousepad blew us away. The two-in-one performance of the mouse mat makes it a tasty option indeed. However, the rather gratuitous silver tin that the pad comes in (the pad is 5mm thick and the tin is 40mm thick) means that this is not a cheap option, as it greatly increases the cost of importing it into the country.

Unfortunately, the surface is made of fabric-backed plastic, which means that the pad is a Mecca for the assorted spills and mess that can occur in the heat of battle. But you'll be pleased to know that it is easy to clean. The fabric back is the only negative aspect of the sUrface1030, other than the price.

SUMMARY

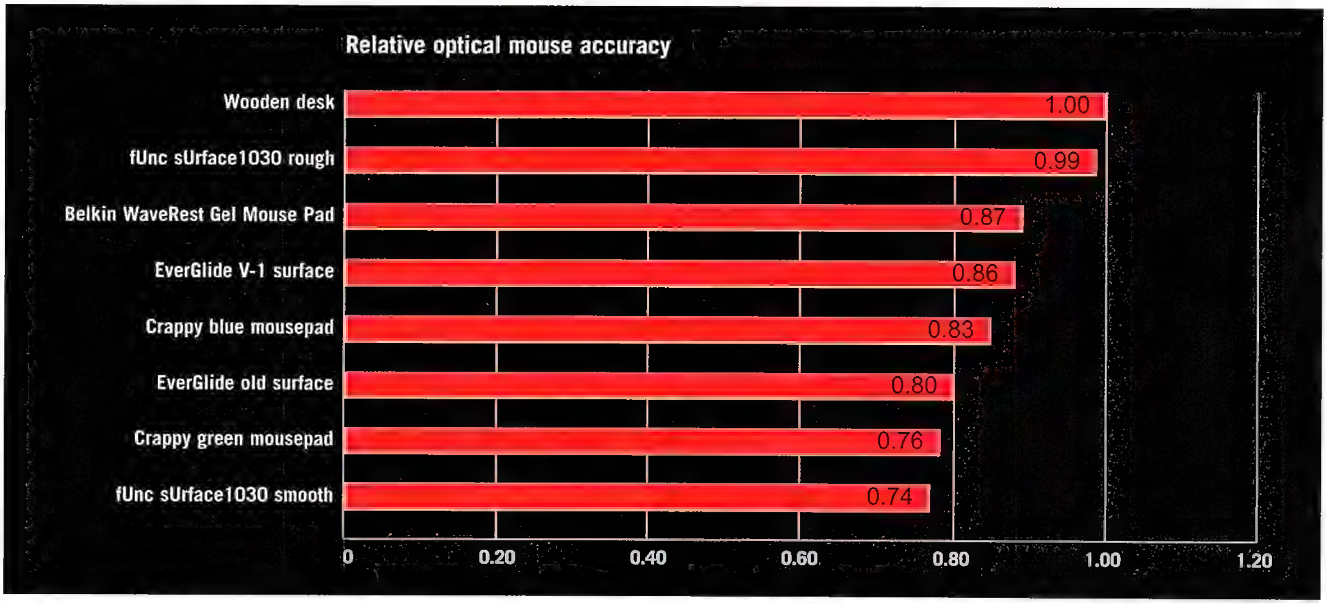
SUPPLIER: AusPC Market
www.auspcmarket.com.au
PRICE: $63.80

SMOOTH SURFACE

SURFACE: plasticised parchment
TFM: 4.6
ACCURACY (BALL): 38%
ACCURACY (OPTICAL): 31%
BEN: Like garden snail mucus, but somehow grippy. Pleasing.
JOHN: Feels so good it makes it hard to concentrate on aiming.
BENNETT: I don't like it (*blows raspberry*).
KATE: Smoooooooth!

ROUGH SURFACE

SURFACE: Plasticised wet and dry sandpaper
TFM: 4.7
ACCURACY (BALL): 30%
ACCURACY (OPTICAL): 42%
BEN: What I imagine Aerogel feels like.
JOHN: Even better than using an aimbot.
BENNETT: Mouse nirvana
KATE: Way too rough for me.



Padding it out

The accuracy result graph has been normalised against the desk result to show how much of an improvement (or not), the pads give over this basic surface. In terms of gaming performance, the fUnc sUrface1030 is a tasty proposition. Unfortunately, the price leaves a lot to be desired. For price, performance and durability the EverGlide series is still a good option, and will definitely prolong the life of your mouse's glide pads. The GIGANTA is worth the few extra dollars in order to get the biggest surface possible.

For optical mice, the desk is still a viable option, as long as it has a flat, even surface. But a decent-quality mousepad is a good investment, and should last a while – from personal experience, I have worn out IntelliMouses well before my EverGlide. ▢

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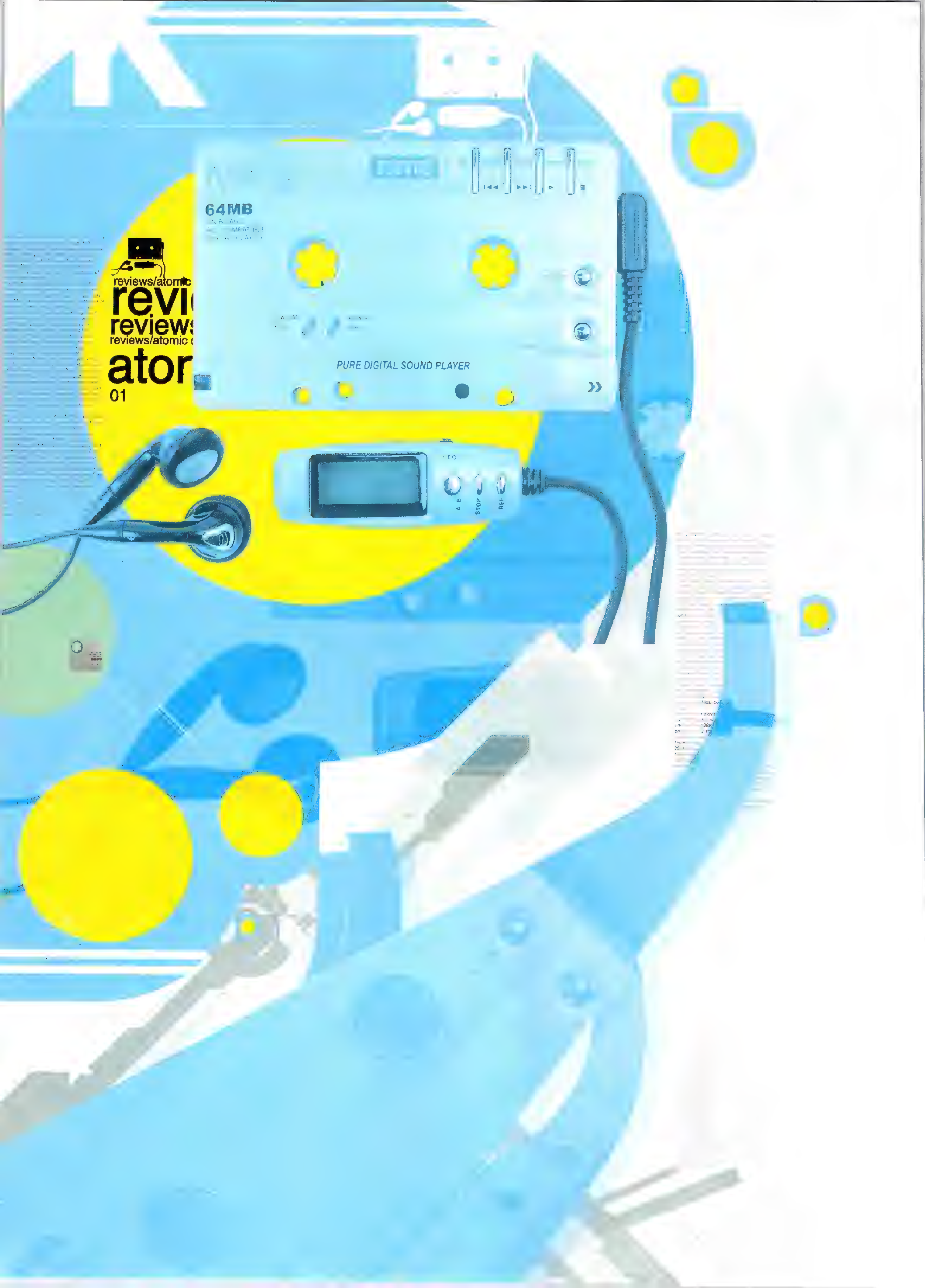
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The Athlon's Achilles Heel

In case you hadn't noticed, we like our Athlon processors at atomic. The unique combination of low prices and top-of-the-line performance has given this processor a special place in the heart of atomic. Ask any of the gamers in the atomic offices what CPU they use at home, and nine out of ten of them will tell you: 'Athlon, of course'.

As a result we often rave on about how much we like these CPUs, and you would be hard-pressed to find a single bad word about these processors in any of our previous articles. But after attaching and reattaching 20 different heatsink/fan combinations to a 1GHz Socket A Athlon for our heatsink round-up, its time to let the bad words flow.

Two words sum up the problem with the Socket Athlon: crushed cores.

In the course of testing the heatsinks, we destroyed two perfectly good 1GHz Athlon processors. That's about $500 worth of silicon destroyed in the space of a few seconds. How did this happen?

When AMD released the Socket A Athlons and Durons, it decided to use a similar style of CPU packaging to the FC-PGA (flip chip-pin grid array) chips from Intel. This approach differed vastly from the older AMD-K6 Family of CPUs in that there was no longer a heat spreader on top of the CPU. The heat spreader on the K6 was a square piece of metal mounted on the top of the CPU die that made contact with the heatsink base. This just happened to protect the CPU from the pressures of installing a tight heatsink.

However, the Socket A Athlons did away with this heat spreader, and instead left the CPU die totally exposed on the top of the packaging. This left the heatsink sitting directly on top of the CPU die. We're not sure if this was to increase the thermal dissipation of the CPU die or to lower costs, but regardless, it leaves a very fragile and expensive component exposed to the rigours of installing a heatsink.

To combat this problem, AMD mounted four rubber pads on top of the ceramic base of the chip. These are supposed to hold the heatsink level above the CPU die until the heatsink fan clip is attached. Unfortunately, they simply don't protect the die well enough.

We've heard countless tales of chipped Athlon CPUs, but we kept putting it down to user error after our 1GHz reference CPU survived for eight months without a problem. However, after installing only five of the heatsinks in the round-up, a tiny chip in one corner of our beloved reference Athlon's CPU die rendered it useless. We were warned this would happen, so we took care to make sure each heatsink was perfectly flat when being mounted – to no avail. Unfortunately, the brute force needed to mount some of the heatsink/fan combos seems to have been too much for the Athlon.

There was nothing left to do except source a replacement CPU and then retest the heatsinks. Luckily, this second CPU managed to survive for the duration of the tests, but only just. After we had tested every heatsink fan, the machine was fired up to test a video card. The smell of burning silicon soon alerted us to a problem. Upon removing the heatsink fan, we were confronted by a crack running through the centre of the ceramic plate, splitting the entire chip into two large chunks. So the die isn't the only fragile piece on the Athlon.

While Intel used to package its Pentium III and later Celerons in a similar, exposed die package, it seems it have learnt the lessons that AMD still have to figure out. The Pentium 4 is packaged with a large heat spreader covering the CPU die, and even the new Tualatin chips have the same protective packaging. If Intel has realised the fragility of the core, it shouldn't be long before AMD wise up and start shipping their CPUs in a similar package.

The worst thing about all of this is that the AMD warranty does not cover this type of damage. And if people who install heatsink fans every other day of the week can crunch an Athlon core, then it's probable that most people with less experience will one day do the same.

It's baffling to think that AMD can build such a complicated piece of silicon, yet neglect the simple problem of the physical packaging of the unit. This problem looks set to continue with the Athlon 4, as it uses almost identical CPU packaging. Until AMD rectify this problem, or heatsink manufacturers start using their R&D dollars to develop much better clip mechanisms, we can only emphasise the care that must be taken when mounting a heatsink to the Athlon processor. If you don't remove your heatsink often, it probably won't be a problem for you, but it's better to be safe than sorry.

Bennett Ring

atomic benchmarks

Take a look inside the atomic Labs testing procedures.

Here at atomic it is our primary intention to give you the final word on the latest in hardware and PC technology. An integral part of determining the performance of a particular piece of hardware is benchmarking, and this is something that we take very seriously in the atomic Labs.

atomic Applications Benchmark

The atomic Applications Benchmark suite uses an assortment of off-the-shelf applications and is an excellent test of a system's overall performance – including CPU, RAM, hard disk and graphics card – when running conventional 2D programs. Desktop resolution is set to 1,024 x 768 at 32-bit colour, DMA is enabled and the latest drivers are used for all hardware, including chipset inf updates.

SiSoftware Sandra 2001 Professional

Sandra, from SiSoftware (www.sisoftware.co.uk), is a comprehensive benchmark and diagnostics utility. It contains dozens of special module applets that retrieve detailed information about the specifications and settings of a system by polling each component's built-in firmware or BIOS. Sandra also features a small suite of synthetic benchmarks for specific components such as CPU, memory, CD-ROM and hard disk. It also features a burn-in wizard for stress testing overclocked systems.

3DMark2000 Pro

3DMark2000 Pro from MadOnion (www.madonion.com) is a powerful benchmark for testing Direct3D performance, and is the successor to the popular 3DMark99 MAX. Although it is a synthetic benchmark, it uses the advanced Max Payne 3D engine, which is representative of the latest in Direct3D performance and technology.

3DMark2001 Pro

3DMark2001 Pro from MadOnion is the next progression of the popular benchmark. It also uses the MAX-FX engine from Max Payne and heavily emphasises DirectX 8.0 functions, including programmable shaders. The results are not comparable with results from 3DMark2000 Pro.

Video2000

Video2000 is another MadOnion product designed to test video card performance. It doesn't measure 3D performance, but instead focuses on visual quality and video decoding performance.

Quake 3: Arena atomic demo

Quake 3: Arena (Q3A), from id Software, is the very popular first person shooter representing the latest in OpenGL gaming technology. Q3A has a built-in benchmarking utility and built-in demos that can test graphics card performance. These demos are fairly simplistic, and are not representative of the worst conditions that the game can offer to a graphics card. So we developed our own atomicmpc demo that pushes the hardware as far as possible.

Other benchmarks

Sometimes we need to break down the tests into more specific areas such as hard disk performance, or a particular facet of 3D like T&L or SSE. For these specific purposes we can draw upon a vast number of applications, games and dedicated benchmarks such as CD Speed 99, DisplayMate, Evolva, MDK2, Adaptec ThreadMark, Aquamark or Serious Sam.

Whenever we use one of these special benchmarks we will outline the nature of the tests, the testing procedures and any settings we use.

atomic testbench specs

There are two testbenches in the Labs: one for running AMD processors and one for Intel processors. Both are running Windows Me, DirectX 8.0a or DirectX 8.0, Live!Ware 3.0 for Windows Me, and Detonator 12.41 drivers.

- **AMD Athlon Thunderbird 1GHz system – ASUS A7V133 motherboard**
- **Intel Pentium III 1GHz system – ASUS CUSL2 motherboard** (Both supplied by CASSA, www.cassa.com.au)
- **Intel Pentium 4 system – Abit TH7-RAID motherboard** (Supplied by Abit, www.abit.com.tw)

Common components

- **Transcend 128MB PC133 CL2 SDRAM** (Supplied by CASSA)
- **Transcend 128MB PC2100 DDR RAM** (Supplied by CASSA)
- **Samsung 256MB PC800 RDRAM** (Supplied by CASSA)
- **Hercules Prophet II GTS 32MB** (Supplied by Guillemot, www.hercules.com)
- **SoundBlaster Live! Player** (Supplied by Creative Labs Australia, www.creaf.com)
- **ASUS 12x DVD-ROM** (Supplied by CASSA)
- **7,200rpm Ultra DMA/100 20GB hard disk**
- **Floppy drive**

Benchmark settings

3DMark2000 Pro

- 1,024 x 768, 16-bit colour, 16-bit textures, 16-bit Z-buffer, triple frame buffer
- 1,024 x 768, 32-bit colour, 32-bit textures, 24-bit Z-buffer, triple frame buffer
- 1,600 x 1,200, 16-bit colour, 16-bit textures, 16-bit Z-buffer, triple frame buffer
- 1,600 x 1,200, 32-bit colour, 32-bit textures, 24-bit Z-buffer, triple frame buffer

Quake 3: Arena atomicmpc demo

All tests use Quake 3 1.27g

- CPU: 320 x 200, maximum geometry detail, minimum graphics settings, high sound quality
- Graphics cards: 640 x 480, normal quality graphics settings, high sound quality
- 1,024 x 768, maximum graphics settings, high sound quality
- 1,600 x 1,200, maximum graphics settings, high sound quality

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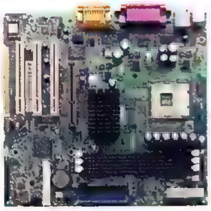
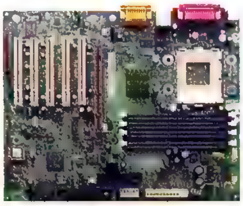


MX4BS

- Intel 845 chipset, Micro ATX
- Support PC133 /PC 100 SDRAM to 3GB
- Intel 10/100Mbps LAN onboard
- IDE 33/66/100 support
- 3D Audio onboard

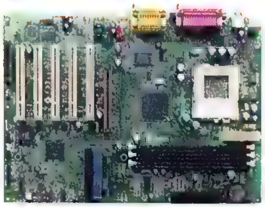
Intel 850



AX4T

- Intel 850 chipset for socket 423 P4
- Support PC800 RDRAM to 2GB
- Intel 10/100Mbps LAN onboard
- IDE 33/66/100 support
- 3D Audio onboard

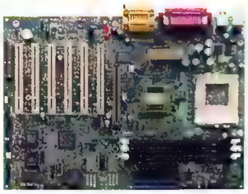
Intel 815E B-STEPPING



AX3S-U

- Intel 815E B-steping chipset for all PIII CPU
- i752 3D AGP onboard
- 4X AGP Port
- IDE 33/66/100 support
- 3D Audio onboard

Intel 815EP B-STEPPING



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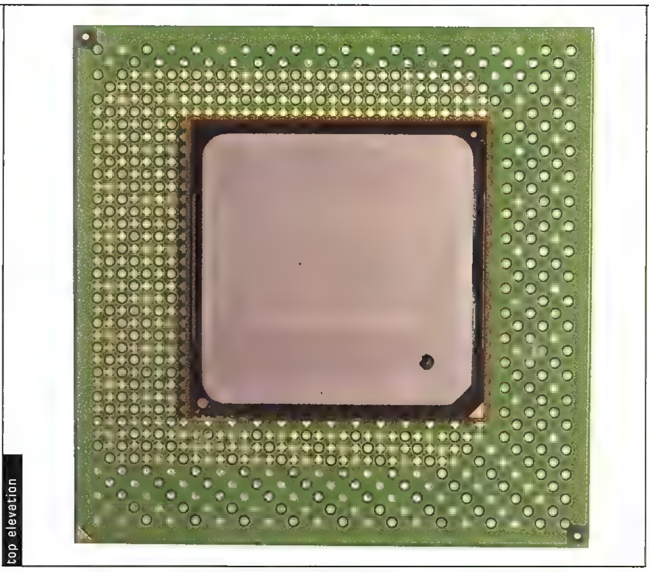
Intel Pentium 4 1.8GHz

With the magical 2GHz mark rapidly approaching, John Gillooly checks out the latest step.



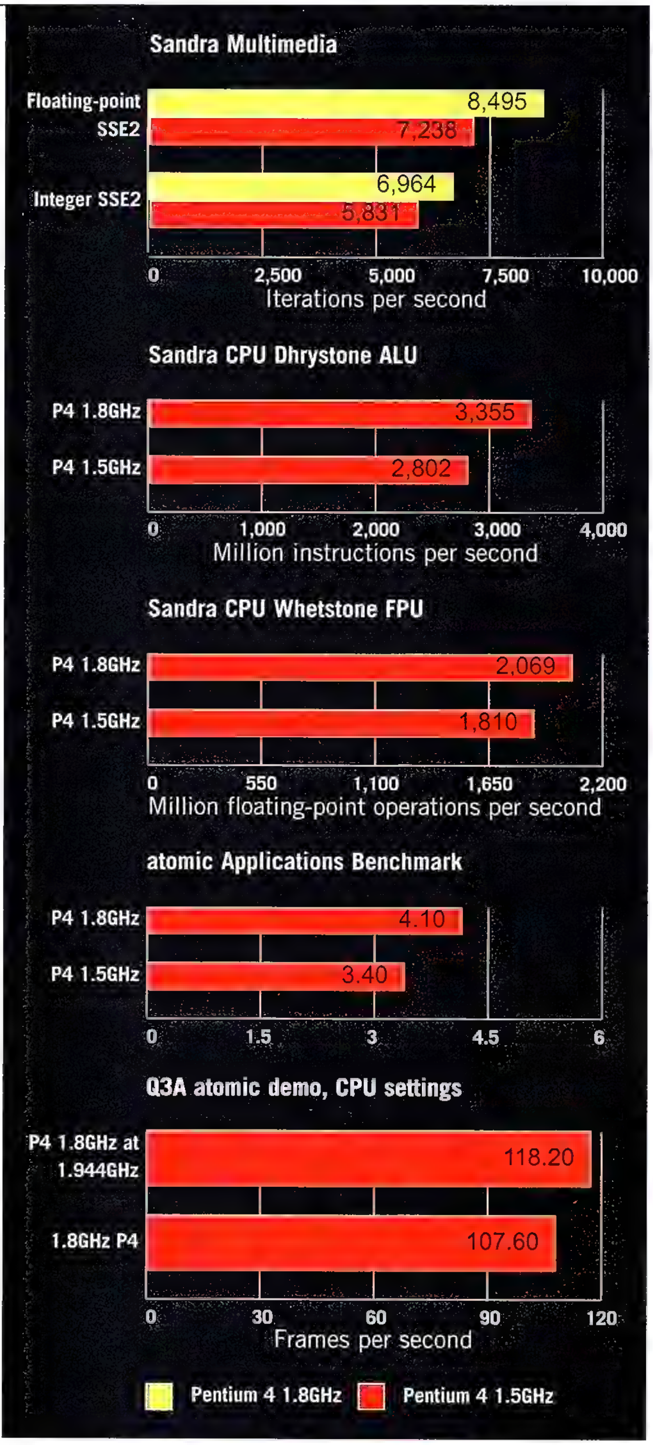
In terms of raw megahertz this is the fastest consumer processor on the market, hands down. Of course, Intel has been known to say in the past that megahertz isn't everything – a comment that has bitten them on the arse ever since the Pentium 4's release. The slow performance when compared to the Athlon is well documented, and something that is slowly being fixed.

As programs start to appear with Streaming SIMD Extensions 2 (SSE2) support, which will be facilitated by Microsoft's recently released SSE2-compatible compiler for Visual C++, the performance gap will widen. By the time this begins to happen, the processors will hopefully have dropped in price, and the move away from the current 423-pin processors to the newer 478-pin processors will be in full swing.

We tested the 1.8GHz Pentium 4 using our ABIT TH7-RAID testbench, with 256MB of PC800 RDRAM. The results have been compared to the 1.5GHz Pentium 4. The processor was tested at its default clock speed, and then overclocked via the frontside bus (even Intel's sample CPUs seem to be multiplier locked nowadays). The processor ran for 30 minutes at 1.98GHz before crashing, but was stable at 1.944GHz (using a frontside bus speed of 108MHz).

Like the other Pentium 4 processors, the 1.8GHz is by no means a slowcoach; however, some of the results do leave a little to be desired. The atomic Applications Benchmark result of 4.1 is one of the fastest that we have seen, but sits behind the scores achieved by well-constructed Athlon 1.4GHz systems. In the Quake 3 tests, the now traditional high frame rates continue, with an increase in performance of more than 30% over the Athlon 1.4GHz.

For those looking at making a serious long-term investment in hardware, this is a very attractive chip. However, the reality of the situation is that, with the 478-pin processors just around the corner, this is somewhat of a dead-end CPU for those who like to stay on the leading edge of technology. The Pentium 4 is finally starting to get the software boost it deserves, but for the 423-pin processor at least, this may be the last hurrah.



SPECIFICATIONS

Intel NetBurst microarchitecture, 423-pin form factor, SSE2 instruction set, integrated heat spreader, 8KB level-1 data cache, 12K micro-ops in level-1 cache, 256KB on-die level-2 cache

Web site: www.intel.com **Price:** N/A

Dual Cold Cathode Light Kit

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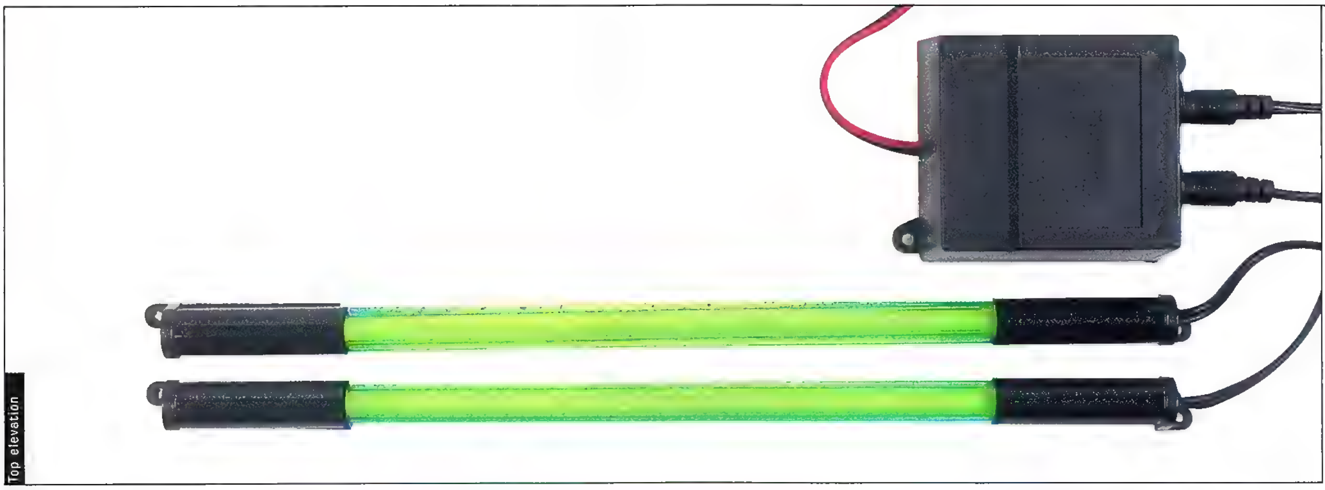


Character. You've either got it or you don't. Character of a rig is defined largely by exterior aesthetics. While a neon case mod is no longer seen as totally original, it still goes a long way to turning your old tin can into a luminous attraction.

Cold cathode neons have been around for quiet a while and are used primarily to light LCDs. Manufacturer PC Case Mods claims its Cold Cathode Tube is among the most advanced in the world. It's 2.6 times slimmer than other neon lights, yet still retains the same if not brighter glow. The 30cm split Y Molex connector is a smart choice for its length and for the fact that you don't lose a plug. Luckily, you don't need a 3-megawatt PSU to power this thing; at 2.6W per neon, any decent PSU should do the job.

Two is better than one, and the slim Dual Cold Cathode is a welcome step away from the conventional large, single tube. The kit, consisting of two lights, allows you to fit two different colours (from a choice of six) and saturate your case with a gradient mix not possible on the single tube lights. Measuring 1.15cm in diameter, the 9in (23cm) tube fits comfortably in any position you can think of. Instead of using an adhesive as the attaching agent, this set uses mounting velcro. The extra flexibility offered here is great, as you can change the positioning whenever you feel like it (best if you have extra velcro). Can't find that missing screw? Grab your cool cathode and its light will guide you.

Installation involves the intricate fusion of a male and female Molex connector, as well as connecting the two neon tubes to a small, mysterious, black box dubbed the 'inverter'. Once this is done, simply De-Dust (pun intended) two spots in your case and attach the adhesive velcro pads.

Unless you plan to take your rig to a LAN party every week, the velcro attachment is not totally necessary. The neon tube is protected by a hard plastic shell, giving the light enough ruggedness to be slid into any corner you can dig out. Provided your positioning is cunning, you gain the extra flexibility of future rearrangement and negate the need for the velcro. The cathode's exterior is all hard plastic, so your can shove it around without fear of frying your components. Thankfully for the temperature-sensitive overclockers out there, very little heat is radiated and the overall green glow helps to create the illusion of a cooler PC.

One slight problem, though; your brand-spanking-new blue/red/black PCB takes one step back towards boring old green under the unwavering glow of these babies.

My initial doubts about the effectiveness of the neon were flushed away as soon as I hit the power. In an instant the dark room was flooded with a magical atomic green – maybe it's worth the 60 beans after all. With a perspex window, your rig is instantly transformed into the centrepiece of the room. It works even better if you have an open case. The glow is bright enough to illuminate your keyboard, which is perfect for your midnight gaming habits. And in case you haven't got the energy or madness to chew a hole in your case and add perspex, the kit isn't entirely useless. Using the standard AOpen case with the multiple roles of tiny, square holes lined across the bottom, the neon glows vibrantly from within, almost creating the illusion that your rig is an active nuclear reactor.

> 'Installation involves the intricate fusion of a male and female Molex connector . . .'

Make no mistake: the Dual Cold Cathode is not the Rolls-Royce of neon lights. It's a decent package that gives you everything you need and nothing you don't. It creates no noise, no heat and at just under $50 (or $59.95 with the switch), does it add character to your PC? Hell, yeah. After all, what's more blissful than the soft wash of atomic radiation at 3am? ▢

SPECIFICATIONS

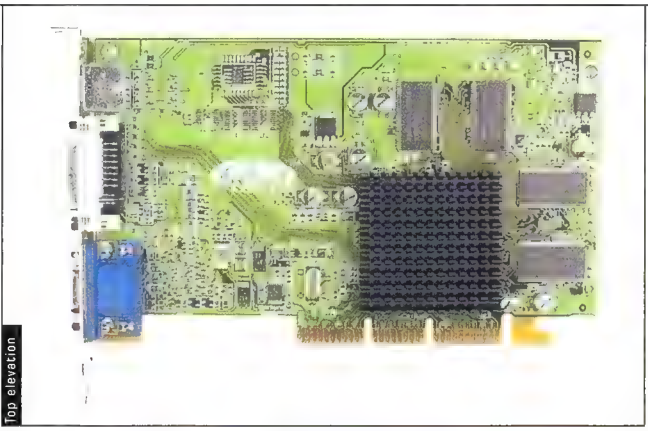
9in Dual Cold Cathode lights, one 'inverter', five strips of high-quality velcro, 30cm Slit Y Molex Connector, 2.6W power usage per neon

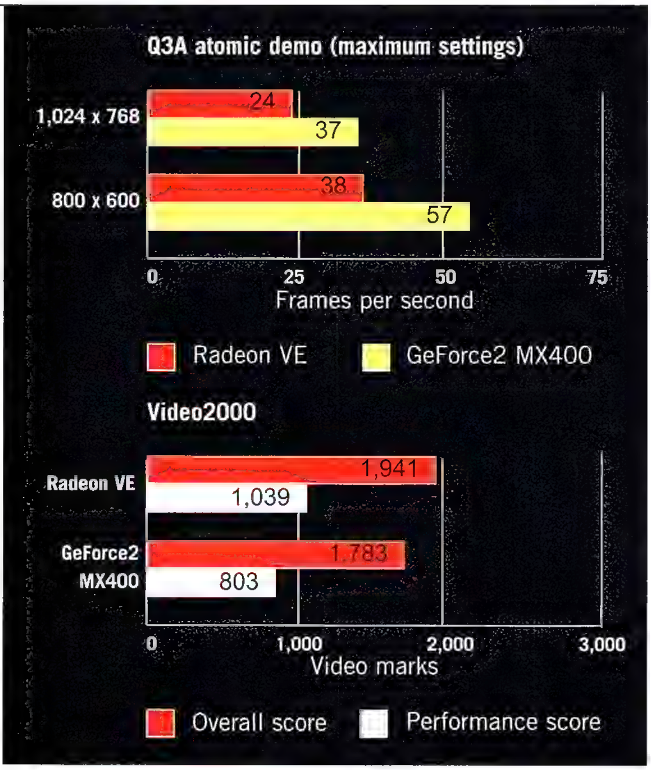
Contact: www.pccasemods.com **Price:** $49.95

atomic
8/10

Radeon VE 32MB DDR

Bennett Ring discovers that two monitors are better than one.





Did you know that there are people in the world who actually use their video cards for something other than playing the latest in 3D games? Hard to believe, I know, but apparently there are a quite a few of these folks in existence. Many of these actually use their PCs for productivity applications, and sometimes prefer to use two monitors. Which is probably why the new Radeon VE has been released. But is it good enough to topple NVIDIA's mighty GeForce2 MX chipset, with its TwinView technology, from its dominant position in the value/business sector?

The original Radeon chipset boasted some pretty impressive features which allowed its 3D performance to come close to the level of the MX chipset. But the bad news is that many of these features have been removed from the VE. In their place are a couple of features that will appeal to those who don't just use their PC to shoot virtual zombies.

The original Radeon had two rendering pipelines, but the VE has halved this to a meagre one. Also missing from the VE is the Radeon's 128-bit wide memory bus, replaced by a 64-bit wide memory bus.

Surprisingly, the VE also lacks one of the most hyped-up features of the Radeon series that ATI wielded in its war against NVIDIA – the Charisma engine. This was ATI's hardware T&L solution that, just like the hardware T&L offered by NVIDIA, lowered the graphic card's dependence on the CPU for transform, lighting and clipping operations.

Finally, the crystal-clear 2D display that ATI are renowned for is not present in the VE, as the 2D image quality appears to be no better or worse than the GeForce2 MX This is due to the use of a 300MHz RAMDAC in the VE, compared to the 360MHz RAMDAC present in most newer ATI cards.

It's had a hell of a lot taken out of it, so there must be some new, fandangled features to balance things out, right? Well, not really. The only notable feature is the dual monitor support, but it must be said that this card does it well. ATI crawled into bed with Appian, a company known for dual monitor hardware in the workstation market, to develop the VE, and it seems to have paid off. There are three possible output devices that can be used on the VE, using the 15-pin VGA, S-Video or composite and DVI-I outputs.

Using Appian's HydraVision technology, managing your desktop on dual monitors couldn't be easier. It quite simply leaps and bounds ahead of the configuration options offered by NVIDIA's TwinHead software. So if your number one priority for your video card is decent dual monitor support, then the VE is your card.

We ran several 3D performance benchmarks on the VE, just to see how the alterations to the card's features affected its 3D performance. In our 16-bit colour 3DMark2000 Pro tests, the VE was consistently 45% slower than the MX card, but its 32 bit colour performance wasn't quite so pathetic, at around 25% slower than the MX.

We also tested using the atomic Quake 3: Arena timedemo, with all settings maxed at a variety of resolutions. The MX consistently thrashed the VE by about 50%. One area that the VE excelled in over the MX was the Video2000 benchmark. This tests the 2D and DVD decoding abilities of the card, and it's here that the VE shines. The VE beat the MX by 30% in the Video2000 performance score, and by about 10% in the overall Video2000 score, making the VE very attractive for those interested in DVD decoding performance.

It's obvious that the 3D performance of the Radeon VE is substandard when compared to the GeForce2 MX. However, its dual monitor and DVD support is very impressive, so if these two factors are important to you, the Radeon VE could be the card for you.

SPECIFICATIONS

0.18-micron manufacturing process, 183MHz core speed, 32MB DDR-RAM, AGP 2x/4x, iDCT support, HyperZ memory technology

Web site: Servex www.servex.com.au **Price:** $370

atomic
7/10

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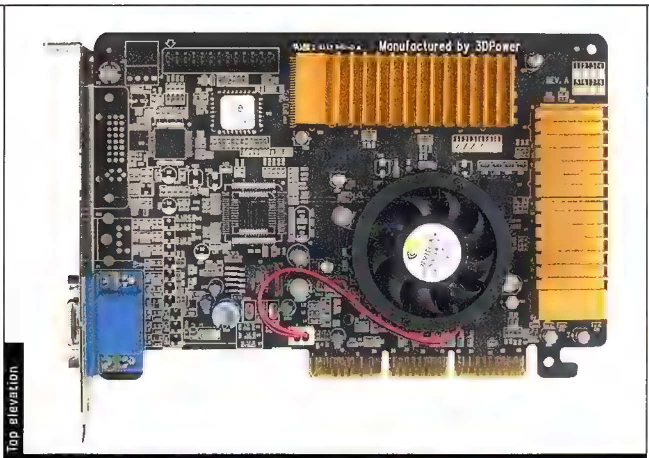
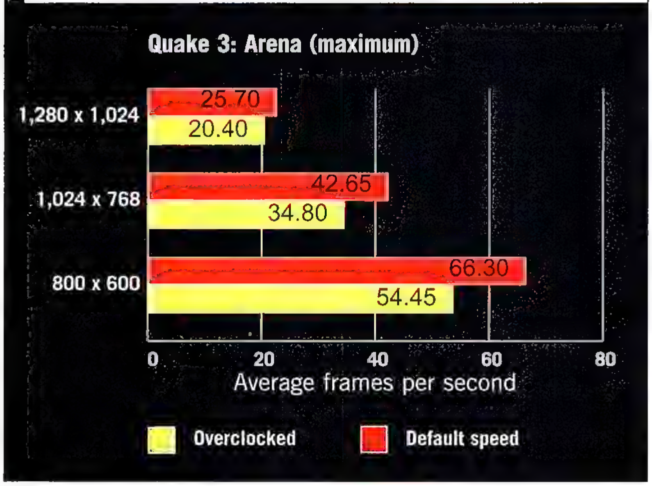
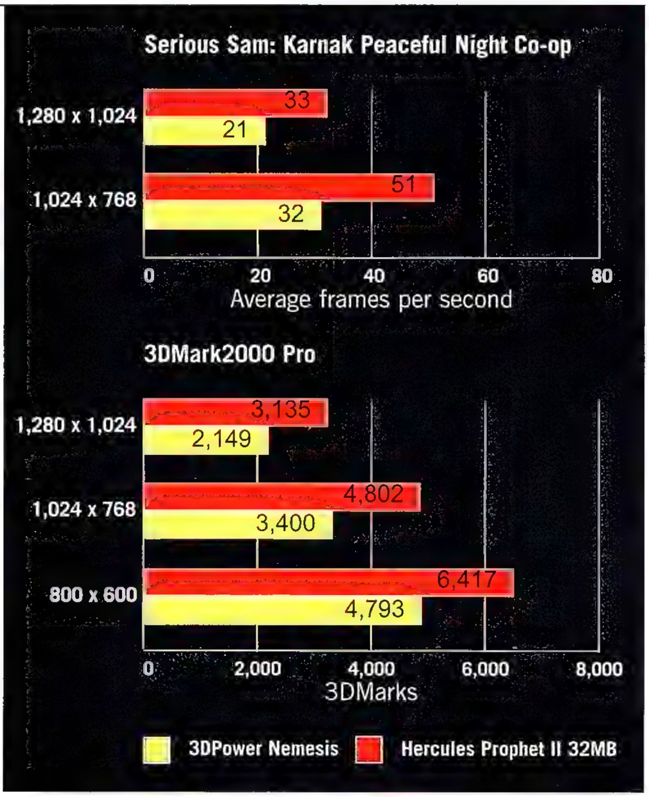
3DPower Nemesis

John Gillooly finally confronts the big showdown with his nemesis.







In last month's GeForce3 round-up newcomer 3DPower snatched the GeForce3 performance crown by the narrowest of margins with the Morpheus. Nemesis is 3DPower's high-end offering in the incredibly competitive MX stakes, and takes the distinctive styling seen in the Morpheus plus a few extra touches to make it one of the best-looking cards on the market.

The Nemesis comes with the same Ice Cube cooling kit used on the GeForce3, and the card is capable of some mighty overclocking feats. It runs stably with the core at 240MHz and the RAM at 400MHz, up from the stock speed of 200MHz core/334MHz RAM. This translates to a performance boost of between 20 and 25% in Quake 3: Arena, which is a nice gain for an MX.

While atomic usually tests new video hardware on a 1GHz Athlon testbench, we tested the Nemesis using our Pentium III testbench due to our Athlon suffering a mild case of spontaneous combustion during an overclocking experiment. The results have been compared to our reference 32MB Hercules Prophet II GTS.

The trade-off that comes with the MX400 chipset is the inability to shine at high resolutions. The sweet spot is still at 1,024 x 768 pixels, and the Nemesis copes admirably here. A resolution of 1,280 x 1,024 is still definitely playable, but it does get choppy during the more action-packed scenes. Cranking up the graphics in Serious Sam, gameplay was smooth at 1,024 x 768, with a low sustained frame rate of 22.1 frames per second (fps). At 1,280 x 1,024 the average frame rate was 21.3fps, with a low sustained frame rate of 16.3fps. This frame rate is playable, but too jerky to be comfortable.

The card not only performs well, it also looks great. Unlike the majority of glossy coloured PCBs on the market, the Nemesis uses a matt-black PCB. While this may sound like a superficial feature, it does make a big difference to the way the card looks, mainly because it helps the card stand out from the common coloured PCBs on the market.

The Ice Cube cooling kit is another nice aesthetic touch. Despite concerns over whether or not RAMsinks actually make a difference, it's good to see them added to a budget-range card. It's also a reassuring indication of the overall attention to detail given to the card's construction.

The card is more expensive than some, but it does use faster RAM than most cards, is highly overclockable and packed with a good bundle of software. It shows quality construction and an impressive level of performance. Although 3DPower is the new guy in town, it is definitely a company to keep a close eye on. ▢

SPECIFICATIONS

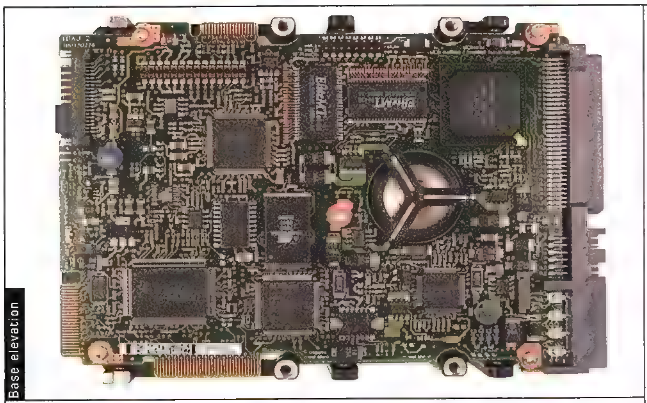
NVIDIA MX400 chipset, 64MB SDRAM, Ice Cube heatsink and RAMsinks, 15-pin D-sub output, WinDVD, three games (one is redeemable from the 3DPower Web site)

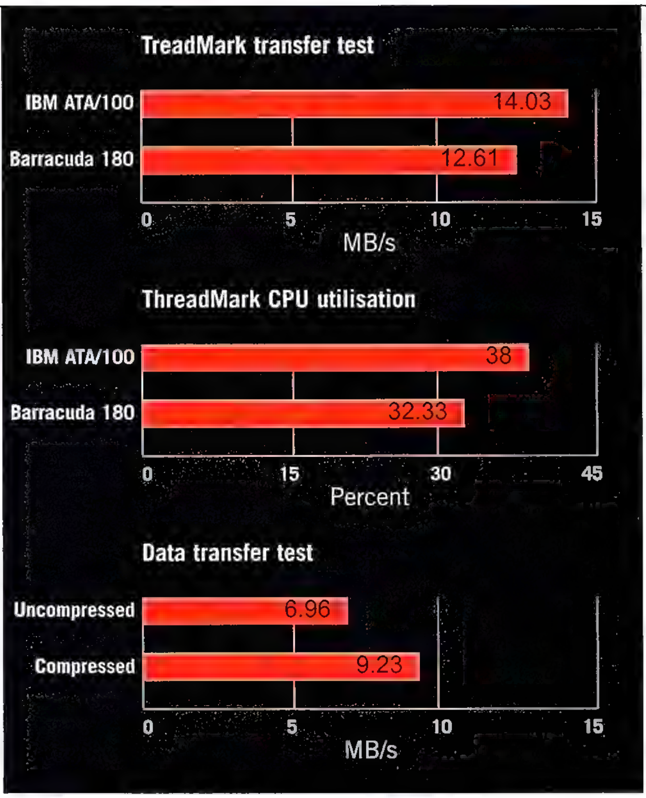
Web site: www.innovision.com.au **Price:** $349

atomic
9/10

Seagate Barracuda 180

This drive is a big, lumbering beast – just like John Gillooly





In the very first issue of atomic we got very excited about Seagate's announcement of a 180GB hard drive. The potential for sensory overload that comes with that much storage space is astounding. No wonder it caused caused random bouts of drooling over the specs.

The Seagate Barracuda 180 is a 7,200rpm Ultra 160 SCSI drive, spreading the 180GB of storage over 12 platters, which equates to an areal density of 15GB per platter. Weighing in at just over 1kg, this makes for one big, heavy mofo of a drive. The 7,200rpm speed is fairly slow when compared to the latest 15,000rpm beasts, but the storage capacity is much greater than other solutions on the market.

There are some immediate problems that spring to mind with this drive. In the strange sphere of hard drive terminology, the Barracuda 180 is what is known as a 'half-height' drive. To put it in context, the majority of drives around at the moment are third-height drives. Full-height drives have long ago gone the way of the Dodo and Afghani Webmasters. This means that the drive will not fit into the majority of hot-swap slots for RAID arrays, but can still be mounted on both the side and base. The other major problem is that the already huge cost for the drive makes its use in RAID arrays an incredibly expensive proposition.

We hooked up the Barracuda 180 to our Athlon testbench using an Adaptec Ultra 160 SCSI card. The drive was tested using Adaptec's ThreadMark and by copying compressed and uncompressed files to the drive. The ThreadMmark results have been compared to our standard 20GB 7,200rpm IBM Deskstar 75GXP drive, using the Promise ATA/100 controller on the A7V133. The results show that the Barracuda is slightly slower than the IBM drive in the transfer tests. This is mainly due to the increased number of platters on the Barracuda – 12 compared to the two platters on the IBM.

The data transfer tests showed overall slower results than the more comprehensive ThreadMark tests, but give a good indication of the performance of the drive under conditions in which file transfer is crucial, such as in server environments. The uncompressed transfer test pushes an assortment of file types and sizes across to the drive, whereas the compressed test gives a good idea of how the drive performs when moving around large files such as video. The Barracuda is by no means a speed demon, but that's not what the drive is aimed at. The mammoth size of the drive means that it is best suited to servers and the like. However, the cost is a big issue.

It is doubtful that the Barracuda 180 will achieve any penetration in the home market in its current form and price. Even for server applications the drive is expensive, especially for RAID solutions. And as far as we can tell, it offers no huge performance advantages over several smaller, and cheaper, drives. Seagate's Barracuda 180 is definitely a drive in search of a highly specialised niche.

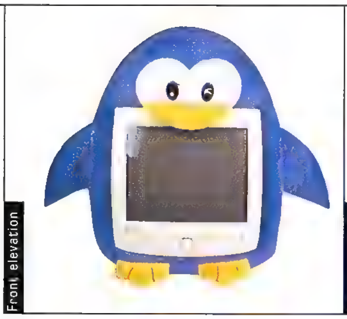
SPECIFICATIONS

Ultra 160 SCSI 7200rpm drive, 12 platters with areal density of 15GB per platter, 7.4ms average seek time, half-height drive, 68-pin connector

Web site: www.seagate.com **Price:** $3,813

atomic
7/10

Cartoon monitor covers



The extremist case modding philosophy is highly geared towards pushing the envelope. What seems cutting edge today is often passé and commonplace in a month's time. To keep the scene pumping along, there is a need for constant injections of inspiration, of thinking outside the envelope. We have seen the future of extreme PCs, and we are happy to say that it is fluffy.

Forget the case. These animal-shaped monitor surrounds are the epitome of cool. Imagine the unbridled fear shown by friends and family when they look towards your pride and joy, only to see a pink pussycat staring back at them!

These monitor surrounds are made of cushion felt, stuffed with whatever dwells inside soft toys nowadays. All we know is that it is probably both toxic and highly flammable if it is designed to be used by small children. This is not a huge problem unless you have a monitor that tends to pump out a lot of intense heat, or you a tendency to gnaw at the corner of your monitor while waiting for long downloads to complete.

Installation of the covers is simple. There are different models for different screen sizes and they simply fit around the edge of your screen, with tension then applied to the sides to keep them in place. Once they are mounted, you can sit back, grin smugly to yourself and think up excuses to invite friends round.

After a day you will realise the horrible truth. You wouldn't think it, but the constant unwavering gaze of a giant pink pussycat can be incredibly intimidating. Another annoyance is that the penguin version of the surround has a yellow beak that flops down and covers an admittedly small part of the screen.

The fluffy monitor surround can be either the perfect accessory for the lover of all things kitsch, the trendy alterna-freak or the doting parent. They are just a bit of harmless fun. The only things to worry about are the disconcerting nature of giant animals sitting on your monitor, and heat problems that could stem from monitors having airflow blocked by the cover. ▢

SPECIFICATIONS

Available in different CRT monitor sizes and in penguin, dog and cat models. Just like shoving a monitor through your favourite teddy bear.

Web site: www.cronline.com.au **Price:** $89.95

atomic
6.5/10

MPZOO HVC-100E Exonion

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The Exonion MP3 player uses a unique storage medium for MP3 tracks. CD-R discs now replace the expensive solid-state memory used in most MP3 players. While this allows you to store over 10 hours of high-quality MP3s on one CD, it also necessitates you having a CD burner installed in your home PC. Considering the popularity of burners today, however, this won't exclude too many people.

Even though the Exonion uses the CD-R format, songs won't skip when you're on the move, as the Exonion buffers up to eight minutes of the track to stop this occurring. When playing a normal CD, up to 48 seconds of the track are stored. A side effect of this buffering is a pause of a few seconds whenever a new track is cued up. Thankfully, it's not too annoying, and the anti-skip feature works well.

A great feature of this MP3 player is its ability to play any format of MP3. Compared to most other players that are limited to only a few of the many types of MP3 files, this feature will be a major bonus for those with large libraries of existing MP3s.

Two AA rechargeable batteries are also included, which can be charged in the player when it is attached to the supplied power pack. Bookmarking and playlist options are more comprehensive than we've seen on any other MP3 player.

Unfortunately, the sound quality isn't the greatest we've heard from an MP3 player, especially when compared to the Intel model we reviewed this month. This is probably the largest MP3 player on the market, due to the CD-R format, but a small remote control is included so the player can be stashed away in your bag. At only $499, this feature-rich MP3 player offers outstanding value for money. ▢

SPECIFICATIONS

375g, compatible with every MP3 format, two rechargeable AA batteries, CD-R media, remote control, backlit LCD screen

Web site: www.mpzoo.com.au **Price:** $499

atomic
8.5/10

Boston Acoustics BA7500

Flat is phat, says Ron Lees.

Boston Acoustics has a reputation as a manufacturer of high-performance audiophile and reference speaker systems, moving in recent years into home theatre and multimedia. The BA7500 speaker system is its top-of-the-range multimedia system, comprising a subwoofer with an integral Dolby Digital decoding amplifier, four flat-panel satellite speakers and a control pod.

The words that came to mind while we unpacked this speaker system and read the instructions were 'versatility', 'simplicity' and 'style'. The four slim satellite speakers can be mounted on desk stands or on the wall. Additionally, the rear pair can be mounted on 50cm high tower stands. The subwoofer supports inputs from one or two stereo analog connections, a digital coaxial S/PDIF connection or a combination of all three. So the BA7500 is able to output stereo, 2x stereo, four-channel or full 5.1 channel surround sound. This versatility enables the BA7500 to be used with a wide range of sound cards and a DVD decoder card. If you only have a stereo sound card, the built-in Dolby Digital circuitry will produce synthesised surround sound.

The control pod allows adjustments of overall volume, subwoofer volume, surround volume and balance. There are no other controls or switches, as the subwoofer circuitry selects the appropriate mode depending on the inputs it receives. This makes it very simple to operate, but some buyers may desire more control over the operating mode.

Although the installation instructions are well written and everything is colour coded, a bit of planning is required to set up these speakers properly. The control pod doubles as the desk stand for a front speaker and connects to the back of the subwoofer with a 1.8m cord. This constraint means that if the control pod is near the listener, then the front speakers and subwoofer will be too. So if the rear speakers are to be heard in balance they cannot be placed far away either. We found it better to separate the control pod from the front speaker, allowing all four speakers to be placed further apart, with the listener at the centre of the sound zone created.

To get the very best out of this system you will need the combination of a good digital 3D sound card and games that make use of surround sound. However, it will make a huge difference to an ordinary system, making a mediocre source sound very good and a digital source sound fantastic. The high frequencies are clear and distinct, while the low frequency effects rumble all around you. Even at full volume the sound is crisp and distortion-free.

The BA7500 realises the full potential of games that have four-channel or EAX surround sound effects. For those unfamiliar with Thief 2, in the game's introduction, an arrow is shot at a shadowy figure who then falls into water. With the BA7500, the arrow clearly 'whistles' past the listener's ear and the 'splash' is heard behind you. Similarly, the BA7500 enables you tell which direction sounds such as voices are coming from.

'. . . the arrow clearly "whistles" past the listener's ear and the "splash" is heard behind you.'

In DVD playback the speakers provide a highly realistic cinematic experience. As the system only comprises five speakers, it is not quite the same as a conventional lounge room home theatre system. Normally a sixth speaker is placed in front of the TV to 'centre' all the listeners regardless of where they are seated in the room. For PC gaming a sixth speaker is not necessary, as the listener is right in front of the screen and the BA7500 simulates one using the Dolby circuitry. However, the lack of a sixth speaker means that careful placement of the satellite speakers is required so that the listener is in the exact centre, as described above.

The BA7500 is excellent for the purpose for which it was designed – a PC multimedia add-on that provides surround sound realism and thumping low-level frequencies – but it is not an audiophile's music system. While cheaper than some of its direct rivals, it is certainly more expensive than some other speaker and decoder combination sets on the market.

SPECIFICATIONS

107dB subwoofer with built-in Dolby Digital decoder; four satellite speakers, four desktop stands, two tower stands and control pod; 6.6kg

Web site: www.bostonacoustics.com **Price:** $699

atomic
8.5/10

Rome II MP3 player

They say that Rome was not built in a day. So it is with its namesakes, the Rome MP3 players. Rome II is Unitech's second cassette tape-style player, with others yet to come. This version has 64MB of onboard memory and a MultiMedia Card (MMC) memory slot for expansion. However, it retains some of the problems of the original version.

The Rome II looks and feels like an audio cassette tape and can be used in a cassette deck or as a stand-alone player. So you can play MP3 files while on the move, in the car or at home. Simply insert the Rome II into a cassette deck and use the deck's buttons to control the player. The package includes a USB cable, charger, headphones, LCD remote control, belt clip, pouch and file transfer software. The USB cable, remote control and headphones all use the same socket, and the headphones also piggyback on to the remote control.

Installing the player and software was easy, with Windows 98 recognising the Rome II as a flash memory card. The software consists of a desktop player that can download and upload files to and from the Rome II, but it does not rip or encode. It can also download files other than MP3s to the player. However, those files upset the flash directory and they, along with any subsequent files, become invisible to the player.

The desktop player will play MP3 or WAV files, but the Rome II will only play MP3 files. MP3s encoded at 128Kb/s played without problems, but the player had trouble with higher encoding rates. MP3s encoded at 160Kb/s sounded like scratched vinyl and 256Kb/s encoding was unbearable. The sound quality of the Rome II player is crisp and clear but does not have a lot of bass response. In the car there was noticeable hiss and spindle rattle during quiet passages. The headphones are of average quality, distorting sound at high volume. When using good-quality headphones, this distortion is not apparent.

The Rome II is clever and innovative, and has fantastic versatility, but the software and firmware let it down.

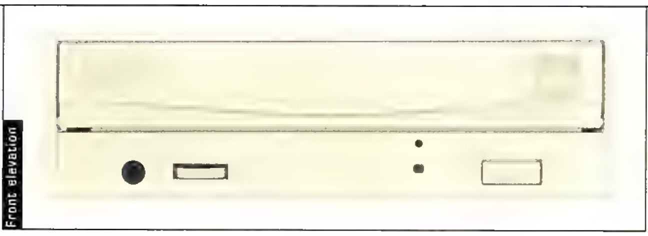
SPECIFICATIONS

64MB built-in flash memory, MMC expansion slot, USB cable, 60g, cassette tape size, rechargeable four-hour NiMH battery for four hours of power, supports MP3 only

Web site: www.romemp3.com **Price:** $495

atomic
6/10

AOpen DRW4624



There are so many tasty pieces of hardware fighting for precious 5.25in hard drive bay space. Temperature monitors, cigarette lighters, fan controllers, POST readouts, audio ports . . . the list is almost endless. Since the majority of midi tower cases only have about three bays, it means that anything that reduces the space taken up by those pesky CD, DVD and CD-RW drives is welcome.

AOpen's approach has been to develop a combination DVD/CD-RW drive, of which there are remarkably few on the market. As the speed of DVD drives increases and the bubble continues to burst on the speed of CD burners, the touted 4x DVD, 6x write and 24x read speeds sit well below the lightening fast stand-alone drives. There are also competing combination drives that run at 8x DVD and 12x write.

The drive was tested using the latest versions of Nero CD Speed (www.cdspeed2000.com) and Nero DVD Speed. The drive tested true to its specifications, with an average of 18x and a peak of 24x read using CAV technology, and a constant write speed of 6x using CLV. DVD transfers averaged 2.7MB/s for a dual-layer disc.

This performance is by no means jaw-dropping, but the drive does live up to the advertised specifications. However, with a price of $500 the drive lags significantly behind competing solutions, and approaches the cost of buying separate (and faster) DVD and CD-RW drives. To put the cost in perspective, your average IDE DVD drive costs a maximum of $200, and CD-RW drives are sitting around the $350 mark for decent 12x drives, even though the bleeding-edge 16x and 24x drives cost a bit more.

Even though the AOpen DRW4624 is an adequate drive, it pales in comparison with the other drives currently on the market. This model is only a viable option if you absolutely need to spare your precious 5.25in drive bays for all those wonderful little add-ons.

SPECIFICATIONS

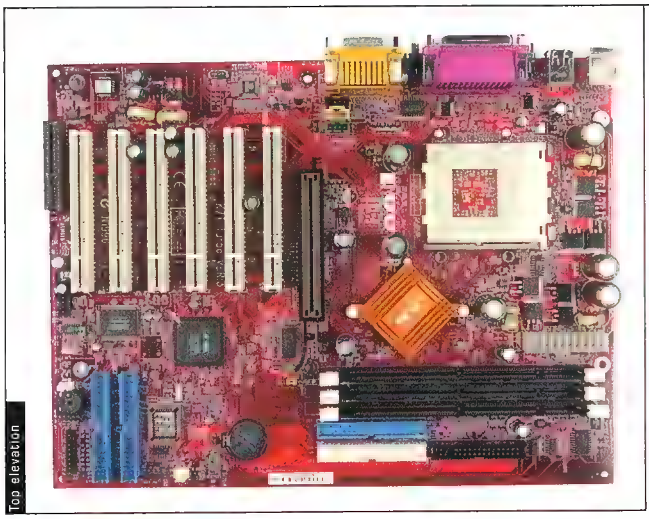
Combination 5.25in internal DVD-ROM/CD-RW drive, 4x DVD read/6x write/4x rewrite/24x read, standard IDE interface

Web site: www.bestbyte.com.au **Price:** $500

atomic
6.5/10

MSI K7T Turbo-R Ltd Edition

John Gillooly sees red over the latest in fashionable motherboards.



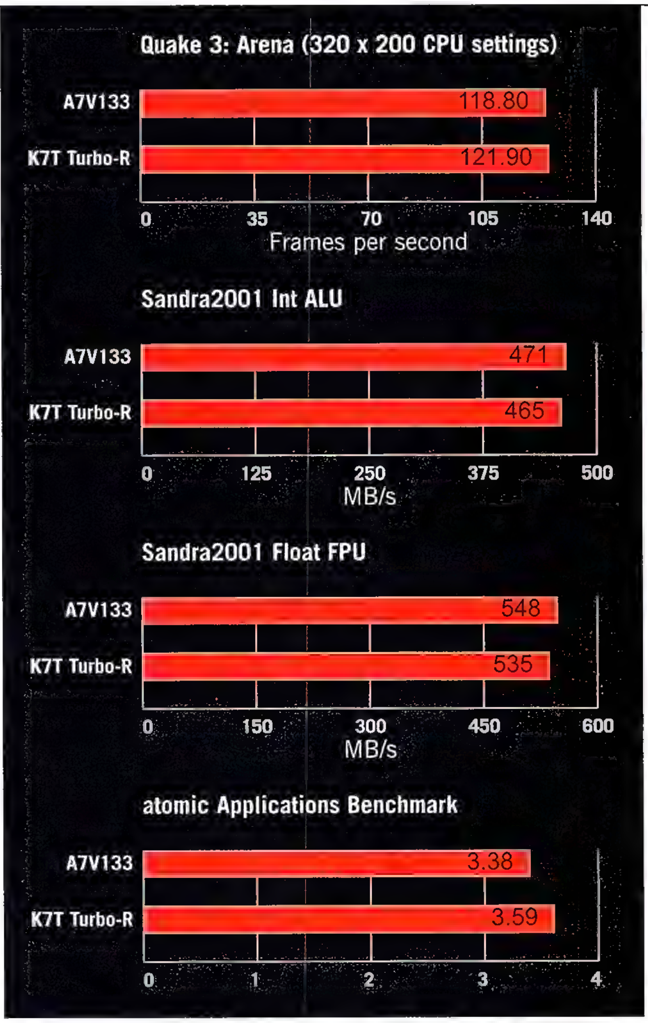
Motherboard manufacturers are all well and truly behind the overclockers nowadays. Gone are the days of having to search high and low for a board that gives you control over your multiplier and frontside bus. In order to compete in a jam-packed market, manufacturers are turning towards added functionality and good looks to draw in custom.

MSI has waded into this battle with its Limited Edition K7T Turbo-R motherboard, which sounds more like the latest in Japanese performance cars than a motherboard. Like a good performance car the K7T Turbo-R comes in red, but lacks racing stripes – something that has disappointed some of the purists at atomic.

> '. . . manufacturers are turning towards added functionality and good looks to draw in custom.'

Colour aside, the K7T Turbo-R is a feature-packed board that uses the SDRAM-based VIA KT133A chipset and features IDE RAID, D-LED diagnostics and MSI's latest toy, inbuilt USB networking. The board supports 100MHz FSB Duron, 100MHz FSB Athlon and 133MHz Athlon processors and, like other Socket A motherboards, should only require a BIOS flash for compatibility with the desktop Palomino processor. As is becoming increasingly common nowdays, the board also comes with a blanking plate that adds two extra USB slots.

While not as mature as the LED readouts or annoying American-accented voice warnings on some boards, the D-LED function is a handy tool for diagnosing hardware problems, and the inclusion of GeneLink's USB networking function is great for those moments when you want to grab files off another PC without having to set up a proper network. Running at 12Mb/s, this solution uses one of the extra USB slots; supports TCP/IP, IPX and NetBEUI protocols; and is both quick and easy to install, as it requires no special hardware on the other computer. The package also includes a software router to enable connectivity to existing networks.



Atomic tested the K7T Turbo-R with a 1GHz Athlon using Sandra2001, Quake 3 and the atomic Applications Benchmark. The results were then compared with our A7V133 testbench. Overall the K7T Turbo-R performed admirably, beating the A7V133 in the Quake 3 and Applications tests and coming close in the Sandra2001 tests.

When you combine this good performance with the unique styling and abundance of extra features, the K7T Turbo-R is a tempting proposition. In an overcrowded market, the K7T Turbo-R Limited Edition stands out in terms of looks, features and pure speed.

SPECIFICATIONS

VIA KT133A chipset, Promise IDE RAID, D-LED Diagnostics, AC97 audio, AGP slot, six PCI slots, USB PC-to-PC networking function, red PCB

Web site: www.msicomputer.com.au **Price:** $290

atomic
8.5/10

AUSTRALIA'S FIRST IT DIRECTORY

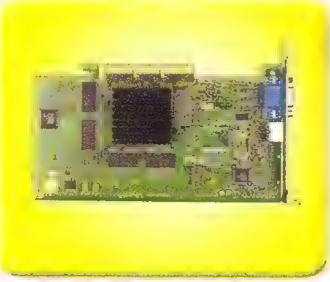
atomic

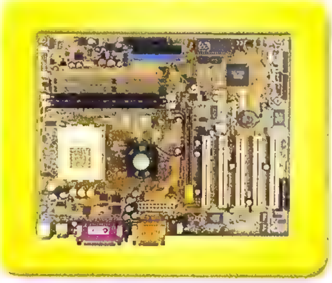
MAXIMUM POWER COMPUTING

It's never been so easy to find that elusive GeForce3 card or track down someone to fix your 21in monitor that just came out of warranty (goddamn it!). We know that there are countless places where you can buy your computer gear. This is not one of them. The IT Directory isn't a place to buy – it's a way to buy. A smart way.

It goes a little something like this . . .

You like products such as GeForce3 cards because they rock. You read about them in atomic and become so excited you are compelled to throw caution to the wind and go and buy them. Which is good. But off you trot to your local reseller and they don't have the product. Which is bad.
So, once again, atomic comes to the rescue – or the atomic IT Directory, to be more precise.





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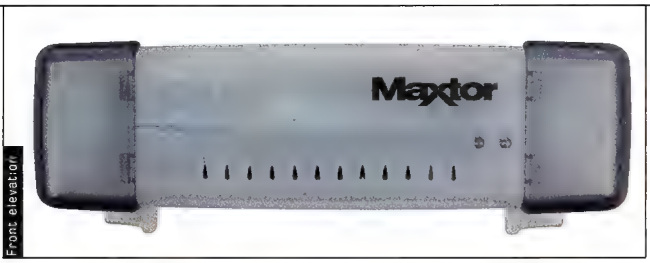
Maxtor 3000DV



It is always intriguing to see how people transport large amounts of data from place to place, be it work files or an extensive collection of DivX ;-) movies. This is usually done by either lugging a jam-packed CD wallet around or physically removing a hard drive. Removable drive bays have been around for ages, but these are inconvenient, especially if the PC that the drive is destined for lacks a compatible bay.

Despite similar problems associated with finding a FireWire-equipped PC, Maxtor's external drive is a more attractive option for the data hound on the go. The drive is a standard 7,200rpm IDE drive that sits in sleek, translucent housing for protection, is externally powered and connects via FireWire. The advantages of this approach are many, particularly as FireWire becomes a more common and permanent solution in the marketplace.

We tested the Maxtor drive using Adaptec's ThreadMark software, as well as by timing the transfer of 1GB of assorted files and a 1.02GB Zip file. The ThreadMark results served up an impressive overall data transfer rate of 15.19MB/s and an average CPU utilisation of 32.33%. The 1GB of assorted files transferred in 63 seconds, which translates to a transfer rate of 16.25MB/s, and the Zip file transferred in 60 seconds, which equates to a transfer rate of 17.41MB/s.

As long as you have access to FireWire ports (there are an abundance of PCI FireWire cards available), the Maxtor 3000DV is a much saner option than physically lugging your internal drives around. There are kits available to convert internal IDE drives into external FireWire drives. While this adds a degree of flexibility to your choice of drive, it also adds a hefty price tag. But if you're prepared to pay, the Maxtor 3000DV takes the hassle out of choosing drives, and delivers excellent performance and capacity for those on the move.

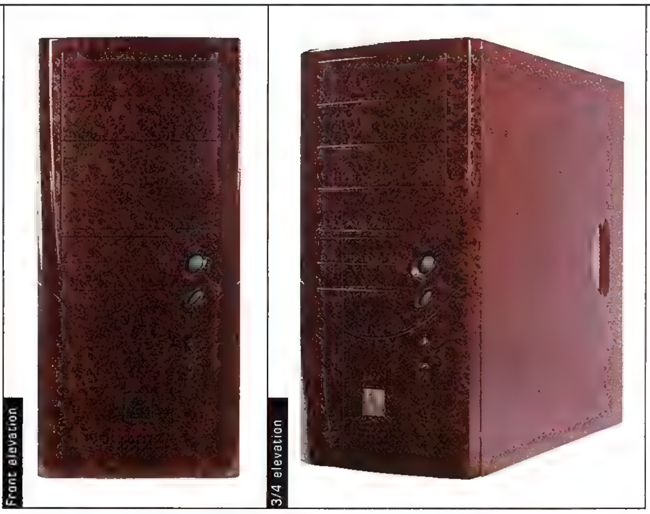
SPECIFICATIONS

External FireWire 60GB hard disk drive, 7200rpm, FireWire cable supplied, average 15.9MB/s transfer rate, PC and Mac compatible

Web site: www.maxtor.com **Price:** $999

atomic
8/10

PC Case Mods skinned cases



Remember all those family-oriented American movies from the 80s? Perhaps the most ubiquitous icon from these films was the humble wood-panelled station wagon. The Walnut Skin case from PC Case Mods is definitely the PC equivalent of this humble icon. Designed to sit happily alongside the finest of antique furniture, the Walnut Skin case is only one of a range of funky case designs from PC Case Mods.

For those who are less conservative, this line also includes a range of finishes such as marble and brushed aluminium, with reptile and leopard skin patterns in development. The paint jobs are nicely done, with a clear 2 Pack Resin to protect the case.

The cases themselves have a fairly simple layout featuring four 5.25in drive bays, five 3.25in bays and a removable motherboard tray. The removable tray is a decent design, with a locking screw holding it down. Unlike the widely used sliding trays, this one folds backwards out of the case, which means that cabling can remain connected when removed. However, all the expansion cards must be taken out of the case before you remove the motherboard tray.

The included power supply is a 300W standard ATX unit – not a Pentium 4-compatible unit – but the case does include mounting holes for Pentium 4 heatsinks. The edges inside the case are mostly rounded off to minimise the all too common skinned knuckles phenomena that accompanies bouts of work inside any computer case.

For those searching the case wilderness, PC Case Mods has managed to deliver a very different style of PC case. The ever-expanding range of designs means that there really is something for everyone, from trendsetters who want the brushed aluminium look on a budget to the more outrageously minded who think that leopard skin is the way to go. But if you're looking for something with a little understated class to match your antique computer desk, then the Walnut Skin case would be the perfect PC housing.

SPECIFICATIONS

ATX midi tower case, four 5.25in drive bays, five 3.25in drive bays, 300W power supply unit, custom paint job with 2 Pack Resin coating

Web site: www.pccasemods.com **Price:** $199

atomic
8/10

D-Link DWL-120 USB & DWL-1000AP

'How can you have a LAN without cables?', ponders Bennett Ring.

Front elevation

Top elevation

Side elevation

The concept of a reliable, high-speed wireless LAN is a recurring theme in many network administrators' wet dreams. Removing the spaghetti jungle that most LANs resemble has more than just cosmetic benefits. Moving networked PCs around the office becomes a total breeze as opposed to a total pain in the butt. Moving the entire network to a new location also becomes a simple task, and the expensive procedure of installing network cable through walls and ceilings becomes a thing of the past. But can wireless networks compare with the speed and stability of a regular cabled network?

The DWL-120 USB network device reminds me of why USB is so damn great, albeit bandwidth limited. Installing the DWL-120 took all of two minutes, without a single hitch. The bandwidth, provided by USB at 12Mb/s, pairs up nicely with the maximum theoretical transmission speed of the protocol used by wireless devices, IEEE 802.11b, which is 11Mb/s. Not that these devices ever reach anything near this speed, but more about that later. While both devices are claimed to be highly compatible with other IEEE 802.11b devices, they don't bare the WiFi seal of approval, which would ensure 100% compatibility with other IEEE 802.11b components.

While the USB networking device installation was so simple that even Helen Keller could have accomplished it, installing the access point on to our current network was, sadly, a different story. After following the installation guide precisely we couldn't get the access point detected. We finally got the unit up and running after a day of tweaking, when we changed a setting that was not mentioned in the manual.

We installed one USB networking device in a desktop PC and the other into a laptop, to enable us to roam around the office to find the maximum range of the network. According to the manual, the maximum range is 100m indoors and 300m outdoors. However, at around 60m (and through two brick walls), the laptop device started to lose contact with the network. While this isn't as far as the manual advertises, it's still far enough to cover a medium-sized office. Unfortunately, neither the access point nor the USB devices have changeable aerials – unlike many other wireless networking kits – so you are limited to these sorts of ranges unless you use additional access points.

Once the network was up and running, it was time to test the data transfer rates of the system. We conducted the tests three separate times: once with the devices 2m apart; another with them in separate rooms 10m apart; and finally with them at opposite ends of the office, with two brick walls between them. We then timed how long it took to copy a 100MB Zip file and 100MB of assorted files from the desktop PC to the laptop. We'd be blue-faced liars if we said the results were anything to write home about.

At 2m the sustained data transfer rate turned out to be 1.4Mb/s, regardless of whether it was the Zip file or the assortment of files. This is nowhere near the peak speed of 11Mb/s. From here things just got worse. At 10m apart, both file copies slowed down to roughly 1.2Mb/s. But even this seems zippy when compared to the sluggish 0.22Mb/s recorded when the devices were 60m apart. Regardless of distance, ping time between the two computers was always below 10ms, making the network perfect for games.

It is starting to become clear that wireless networks can have some serious security issues. All it takes is for a hacker to park outside the office with a wireless LAN-equipped laptop, and a bit of know-how, and your LAN becomes public domain. Thankfully, the D-Link devices use 40-bit Wired Equivalent Privacy (WEP) encryption, with the ability to encrypt at a maximum level of 128 bits.

It's obvious that the D-Link wireless LAN devices aren't as fast as a traditional cable-based LAN. However, if you don't do a lot of large file copying, the performance levels are adequate, especially for simple tasks such as Web browsing. And there is no denying the simplicity of reconfiguring such a LAN.

SPECIFICATIONS

DWL-120: USB 1.1; IEEE 802.11b compliant; 11, 5.5, 2 and 1Mb/s channel; 2.4-2.4835GHz DSSS **Price:** $457
DWL-1000AP: TCP/IP, IPX, NDIS4 and NetBEUI **Price:** $832
Contact: D-Link (02) 9417 7100

atomic
7/10

Intel Pocket Concert

atomic HOT

Something about the simple yet elegant silver-and-blue design of this audio player just reeks of 'Inteliness'. It's certainly not the smallest unit around, but it's still small enough to fit into your pocket – hence the unique name.

The Pocket Concert packs a whopping 128MB of Intel StrataFlash memory, making it one of the first MP3 players to hit our shores with such a large memory capacity. Perhaps the crash in flash memory demand is what prompted Intel to make this MP3 player. After all, the Flash memory that Intel makes has to be used somewhere.

For those that like to mix their MP3 music sessions with a little FM radio listening, the device also incorporates an FM tuner with 10 station presets. Unfortunately, the quality of the reception leaves a lot to be desired, which is a common problem in many of today's portable audio units.

Although the FM radio quality is lacklustre, the same cannot be said of the sound quality of the MP3 decoding. As soon as we began the preloaded tutorial (nice touch Intel!), it was blindingly apparent that this MP3 player has no rival when it comes to sound quality. The deep, rich bass beats and crystal-clear treble tones are all delivered distortion free, courtesy of an 11mW amplifier. The included headphones help to deliver this clear audio at brain-rattling volumes.

Two AAA batteries will keep the player going for about 10 hours, which is standard running time. Connection to your PC is via the included USB cable, allowing you to download a full 128MB worth of music in a couple of minutes. The Intel music management software couldn't be simpler, and the inclusion of MusicMatch Jukebox 6.0 should suffice for your ripping needs.

Intel should be proud of its first attempt in the MP3 player market. The Pocket Concert raises the bar for all MP3 players, packing more features at an affordable price than any other comparable player.

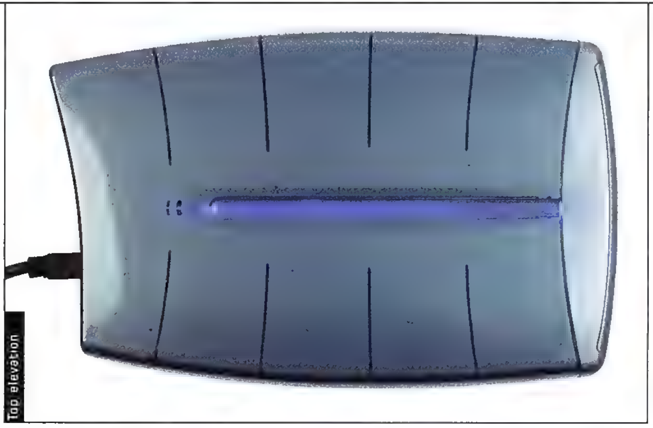
SPECIFICATIONS

128MB memory, USB docking device, digital FM radio, MP3 and WMA support, 0.04% THD+N (Total Harmonic Distortion plus Noise) at 1kHz

Web site: www.intel.com **Price:** $699

atomic
9/10

TDK VeloCD FE-161040



The internal burners in TDK's VeloCD line-up combine distinct stylings with leading-edge performance, a philosophy that has transferred over to its external FireWire VeloCD. The most striking aspect of the fish-shaped external VeloCD is the 16cm-long, bright-blue strip of light on the top of the drive, which emits a somewhat pleasant glow.

But any smug satisfaction that comes from the soothing glow is suddenly and violently shattered when you insert a CD. As the drive spools, you suddenly realise that the light is actually the drive light, strobing incessantly in its effort to render you totally and utterly insane. The only happy solution that we came up with in the Labs was the careful placement of the drive manual over the light in order to give us some peace.

Despite the somewhat painful aesthetics of the drive, this is a great performer. Its FireWire interface allows fast, reliable data transfer, with reads at 40x using CAV and writes at exactly 16x using CLV. The drive took only two minutes and 28 seconds to rip a full CD to WAV files. The drive is both PC and Mac compatible, which is handy if you work between both flavours of computers.

The VeloCD also comes with a swag of bundled software, with Ahead Nero 5.0 and InCD as its writing packages (and Roxio's Toast 4.0 for the Mac). The drive also comes with TDK's CD Blender software suite for audio playback and manipulation.

For a company that places so much emphasis on styling, TDK has made a strange decision with the external VeloCD. Despite the drive's good performance, there are many others on the market that are not as offensive to the senses. The strobing light is kind of fun for about one twentieth of a nanosecond, but after that it really becomes incredibly annoying. If you want stellar performance, then this drive delivers – just remember to check your sanity at the door.

SPECIFICATIONS

External FireWire CD-RW drive, 16x write/10x rewrite/40x read, PC and Mac compatible, bundled with Ahead Nero 5.0, InCD, Roxio Toast 4.0 and TDK Digital MixMaster

Web site: www.tdk.com.au **Price:** $999

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6/10

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Stumbling across the Finnish line

The latest and greatest in the line of 'I thought it was vapourware but now it actually looks like the best game ever' titles is Max Payne. When this small game from Finnish developer Remedy first reared its head several years ago there was a distinct buzz about the game. Previously, the fledgling company had only released two products: the cult shareware hit Death Rally, and the stunning Final Reality benchmark. But before that, several of the members of the team were part of the revered demo group, the Future Crew.

The Future Crew initially cut its teeth in the Commodore 64 demo scene before moving to the newly emerging PC scene. As regular attendees and organisers of the insanely huge European demo parties (some make even the biggest LAN events look small-time), they built a cult following, culminating in the release of the still revered Second Reality demo.

Over time those involved in the Future Crew moved on, with members going mostly to three organisations: Remedy, Bitboys and Remedy spin-off, FutureMark (now called MadOnion.com). At these locations the influence continued to grow, serving to push the development of 3D in subtle and not so subtle ways.

During its relatively short history Bitboys has brought two products to final silicon, but never to market. The first project that a proto-Bitboys was involved in was the Pyramid3D, an early member of the 3D graphics world that had the potential to drive the fledgling industry at a remarkable pace. Coming from the demo scene, the members knew exactly what they wanted from a card, and the Pyramid3D featured technology that was light years ahead of the competing solutions. Environmental Bump Mapping was initially included in the Pyramid3D and was later licensed to Microsoft. Unfortunately, Bitboys' partner, Tritech, abandoned its 3D graphics plans and the Pyramid3D never saw the light of day.

Last year Bitboys had its next project, the Glaze3D, at the final silicon stage. However, the card was never released. Instead, Bitboys' small R&D team went back to the drawing board to tweak the chipset and add a hardware T&L engine to create its as yet unnamed third graphics product.

Looking through a MadOnion

Even for those who don't instantly recognise the name MadOnion.com, there are few computing enthusiasts who haven't heard of its major product, 3DMark. This is one of the most widely used benchmarking programs for gamers – so much so that a new release is as eagerly anticipated as a major game release or Counter-Strike patch. The graphics in each new 3DMark release are indicators of game development over the next year, and often bring new hardware features to light well before they are seen in commercial releases.

3DMark is based on the MAX-FX engine that Remedy developed for Max Payne, and there is still a strong bond between all three companies. In fact the first chance the public had to preview Max Payne was with the Lobby demo in 3DMark2001, which featured one of the trench coat-clad goons from the game in . . . err, homage to *The Matrix*.

With Max upon us, it is interesting to see just how unified the vision of these companies is. In our interview on page 26 with Kirk Leitch from Bitboys, there is a distinct philosophy about the role of 3D in games. Max expands on this, providing one of the most visually stunning game experiences yet.

Graphically, the game uses some amazing tricks and techniques. and most of them relate to the unique concept of Bullet Time, which will of course be compared to *The Matrix* at every turn. In actuality, Bullet Time is much closer to the movies of John Woo, Robert Rodriguez and their contemporaries. This technique has been accomplished beautifully; for the first time you really do feel like Chow Yun Fat ducking and diving in the tearoom shoot-out from *Hardboiled*.

This is achieved through clever graphical manipulation by the MAX-FX engine. As time slows, each bullet becomes visible, muzzle flashes become fully detailed explosions and the air appears to bend as each bullet flies by. The fact that the Remedy crew have been able to pull this off is evidence of their skills. There was a very real chance that Max Payne could have been one of the litany of uninspired third person games that have appeared over the years. Instead, it delivers the most cinematic action gameplay ever seen.

The legacy of the Future Crew has already had a huge impact on the way we look at 3D. With the appearance of the MAX-FX engine, and the rumoured upcoming announcement of the Bitboys' next graphics product, I strongly doubt that this will be the last we see of the growing Finnish 3D powerhouse.

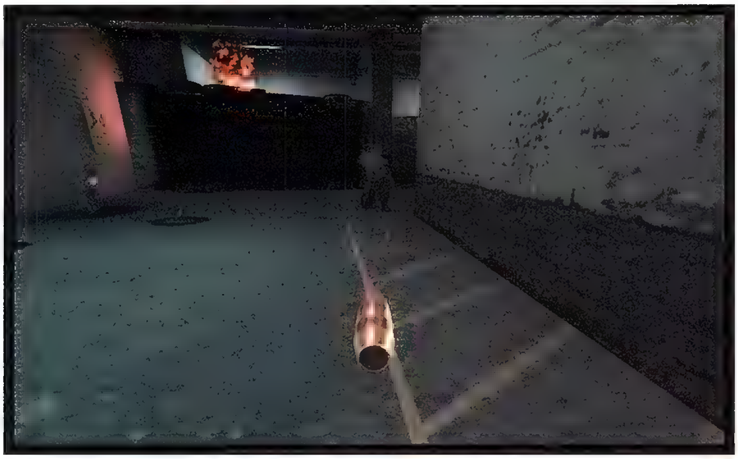
John Gillooly

Max Payne

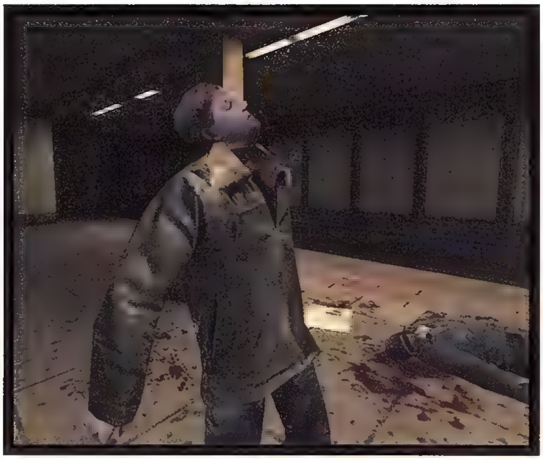
Bennett Ring steps into a world of Payne.

If you haven't heard about Max Payne, you've probably been dead for at least the last four years. In which case this review will be useless to you, as you're not going to be playing any games with those fertiliser fingers. However, if you still inhabit your earthly body, you've no doubt read much about this 'revolutionary' third person shooter. Four years of development has a way of creating an immense amount of hype, and as a result Max Payne certainly has a lot to live up to. But can any game deliver the goods when the expectations have been set so high for so long?

The mere words 'third person shooter' are enough to send many gamers in the opposite direction. The reason why is a bit of a mystery, because there was a time when these words were synonymous with fun gameplay and gorgeous graphics. Perhaps the massive amounts of Lara Croft that we've all been forced to endure over the last couple of years have tainted our view of this once cherished genre. Fear not, as Max Payne is here to remind you of what made this type of game so enjoyable that it warrants its own genre.



One of the amazing cinematic effects in Max Payne, showing a sniper bullet's journey.



The MAX-FX engine truly shines in character modelling.

You play the part of Max Payne, an ex-NYPD detective turned undercover DEA agent who has deeply infiltrated a mob family, with a murdered family inhabiting the recesses of your memory and a yearning for vengeance deep in your heart. Things aren't all rosy though, as you are soon set up by said crime syndicate for the murder of a fellow cop. To make things that little bit more interesting, the murdered cop happened to be the only DEA agent that knew your identity, and your police records and history have been replaced with falsified warrants and criminal records. In this kind of situation, what is a man to do? The answer is obvious – shoot the place to hell and, with any luck, take out the cause of your problems with a stray bullet.

Max Payne uses a unique method of storytelling; it's what is otherwise known as 'the reason you must kill everything in sight'. The developers, Remedy, call it a 'graphic novel', but we prefer to call it 'cartoon mixed with a game'. At the beginning and end of levels, and at certain points within them, the game cuts to a few frames of a cartoon that further reveal the underlying story. These cartoons have a very Sandman feel to them, with some great voice acting for the dialogue. The actual story-line is very dark and gritty, and is definitely not one for the kiddies. But at times it does seem a little clichéd and convoluted. There are over 200 of these 'graphic novel' sequences, which is a few too many for my liking. At times it seems as if they were added just to pad the game out a bit. There are still numerous in-game cut scenes, with a couple of totally surreal drug-induced scenes, and these all look suitably stunning.

MAX-FX is the name of the graphics engine behind Max Payne. You'll most likely already have seen this engine at work in either the MadOnion 3DMark2000 or 3DMark2001 benchmarks, which use MAX-FX for their game performance tests. The mind-blowing graphics in both of these programs are one of the reasons that Max Payne has been so highly anticipated – there simply isn't anything on the PC that looks as good. But if you expected Max Payne to be a dead ringer for the Matrix foyer scene in 3DMark2001, you'll be sorry to hear that Max Payne doesn't look as good. Clear the tears from your eyes, because even though it isn't quite as detailed, it's not far off it. The character models look as if they have a slightly lower polygon count, and the amazing shock-wave effects behind bullets are sadly absent from Max Payne. But other than that it looks pretty much identical. That's to say, it still looks bloody amazing. I'd even go as far as to say this is the most visually impressive game I've ever played outside of the arcades. Knowing how fast games are improving and with the abundance of DirectX 8.0 games on the horizon, this statement should hold true for the grand total of the next 17 days.

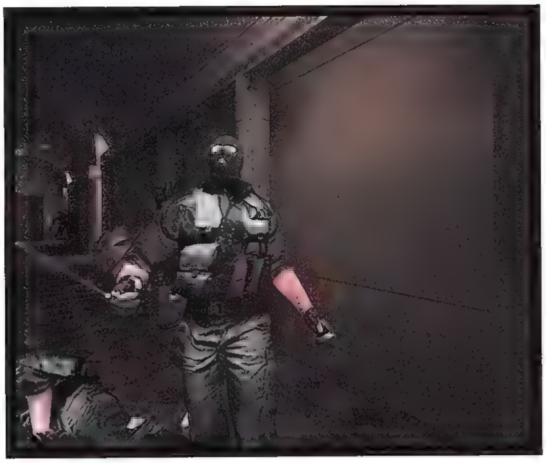
A key feature of the MAX-FX engine is its support for radiosity lighting. This is apparently the most realistic way known to render lighting, and has never been used in a computer game before. The strobing effect of alarm lights and the staccato flashing of firing submachine guns bares testament to how realistic this method looks. The engine also uses a particle system for weapon effects, smoke, fire and water, and the resulting effects are impressive to say the least. Watching Max open up with a pair of Ingram submachine guns is a sight to behold, as flames burst forth from both guns in a mesmerising display of sheer power.

Skeletal animation is becoming popular in 3D games, ensuring that characters move in a lifelike manner. The MAX-FX engine uses this method of animation, and as a result characters look extremely realistic as they go about their duties (which usually entail getting gunned down in a hail of lead).

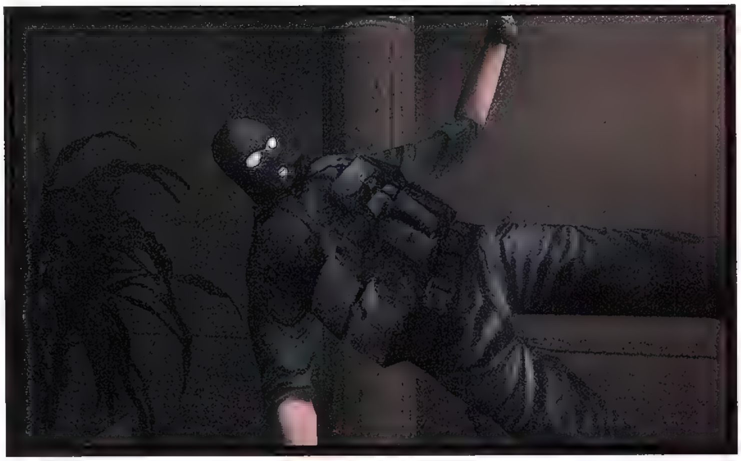
One limitation of the MAX-FX engine is its ability to render outdoor scenes. The vast majority of the scenes within the game occur in indoor areas, and the few outdoor scenes still feel very enclosed. However, the detail present indoors is simply stunning, with most objects being destructible, searchable or usable. Destructible tends to be the most fun. Opening fire at bad guys hiding behind a rack of wine bottles has never been this good.

With such amazing graphics, it would be a shame to miss all of the intricate details that the graphic engine is capable of. This is where the 'revolutionary' part of Max Payne comes into its own. If there are two words that Max Payne will be known by in the future, those words will be 'Bullet Time'. In an inspired rip-off of *The Matrix*, Max Payne has the ability to slow down time, yet still react at normal speeds. Upon hitting the Bullet Time button, time slows to the point where you can actually see individual bullets or buck shot pellets flying towards you, enabling you to dodge them. At the same time, your reflexes aren't slowed, so taking out a room full of perps suddenly gets a whole lot easier. This isn't an infinite power, as a small onscreen meter provides around ten seconds of Bullet Time when full. This doesn't sound like much, but it's amazing how many bad guys you can kill when two seconds of their time becomes ten seconds of yours. For each bad guy that you drop, a small amount of Bullet Time is regained.

A variation of Bullet Time is the shoot-dodge manoeuvre. If you hit the Bullet Time button at the same time as a direction key, Max enters a slow-motion jump in that direction, usually avoiding any incoming fire and allowing a precious few seconds to line up new targets. This manoeuvre uses very little of the Bullet Time energy. Both of these effects are



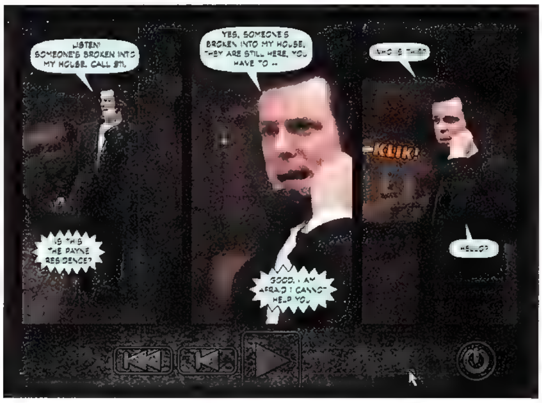
ⓘ In Bullet Time, each bullet becomes visible.



ⓘ MAX-FX also delivers some very Hong Kong-style gunfights

ⓘ With a permanently fixed expression that combines insanity with constipation, Max is one very scary man – with a *lot* of guns.

One of the many highly stylised graphic novel sequences used to drive the story.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visually incredible, as hundreds of bullets fly back and forth between you and your sloth-like enemies in a deadly slow-motion dance. Sound effects are also slowed to match the action, and the end results are breathtaking. These two effects lift this game from being just another Tomb Raider clone with bigger guns, although the description 'revolutionary' is a little strong. It's still a third person shooter, with a few regulation jumping and avoid-the-laser sections, but Bullet Time makes it the most fun third person shooter to have ever hit the market.

There are a couple of other trademark John Woo effects that will also leave you gasping. Bullet Cam sees the camera swing behind the bullets from your sniper rifle for a slow-motion run to their target, while clearing a room will sometimes see the camera do a slow-motion 360° pan of the last target as it falls to the ground.

We played Max on a 1GHz Athlon with a GeForce3 graphics card and it ran beautifully at 1,280 x 960, with all options maxed and trilinear filtering enabled. It's great to see that the required specifications of the game mention the 3DMark2001 scores you'll need to run it well at certain detail levels. This is something more game developers should include in their minimum and recommended specs. It would be nicer if they could be more specific about what low and medium detail actually looks like (resolution? colour depth?), but at least it's a start.

Watching someone control Max through this gloriously rendered world looks like it could be a complex affair, but looks can be deceiving. It handles just like a first person shooter, with mouselook and sidestrafing both included. Max handles quickly and accurately, enabling you to leap over desks and through doorways with both confidence and elegance.

There are 12 different weapons you can use in the game including favourites such as the Desert Eagle pistol, Pancor Jackhammer automatic shotgun, and the Colt Commando automatic rifle. Each handles very differently to the rest, with varying rates of fire, accuracy and bullet damage. Twin Ingrams is a personal favourite, as is the Jackhammer. Unlike some games, each weapon is truly useful depending on the situation. Pistols and shotguns are best used up close, while rifles are the weapon of choice for longer range engagements. The slow-motion effects show off the beautiful muzzle flashes for each gun, as well as their varying bullet types.

You'll need to learn how to use these weapons well, because the AI is for the most part quite intelligent. Enemies usually react as soon as they have line of sight, and many pre-scripted conversations are yours to eavesdrop on.

It all sounds too good to be true. And it is. While Max Payne is one of the most enjoyable, and incredibly pretty, games to ever grace the PC monitor, with it's Hardboiled, John Woo-inspired action and jaw-dropping graphical delights, it is also one of the shortest. Even with its 200 graphic novel scenes I completed the game on the default difficulty in 11 hours. Once the game is completed a couple of higher difficulty options are enabled, but to be honest, playing through areas that have already been seen soon gets a little bit boring. If you happen to complete it in the same amount of time, you'll end up paying around $8.20 for every hour of John Woo joy. Compared to most games, this is miniscule not to mention unforgivable. It's hard to accept that the game can be so short when you know it has been in development for four years. It was either a difficult game engine to develop or it's a hard engine to craft worlds with. Or maybe they all got stuck in Bullet Time when they were making the game. But what makes it hardest of all to accept is that the game is so darn good. You want to keep playing this game forever, because you *are* Max Payne with god-like Matrix powers. But before you know it, it's all over and you're dreaming about the sequel at night. Even Remedy acknowledges that the game is too short considering its quality, with messages in both the manual and the end credits about Max's adventures being set to continue.

If it wasn't for the length, this game would have easily deserved a 9.5 out of 10. As it is, it's lucky to get an 8. I had a great time playing Max Payne, but as as a reviewer it's a relief to know I didn't have to shell out $90 for such a short game.

GAME DETAILS

FOR: Bullet Time (the greatest gameplay innovation of the year), jaw-dropping graphics, gripping and gritty story-line, brilliant action, guns, guns and more guns

AGAINST: Four years of development equals 11 hours of gameplay? WTF? All over far too soon.

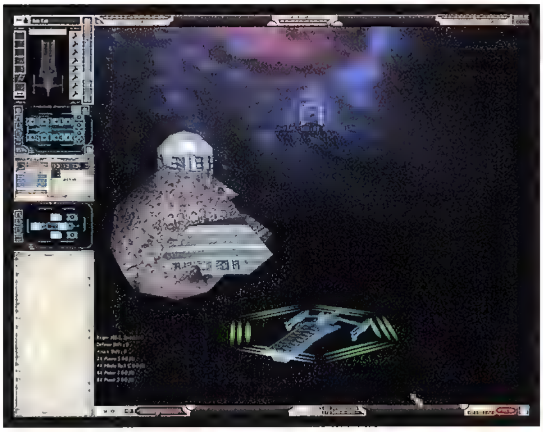
MINIMUM REQUIREMENTS: 450MHz CPU, 96MB RAM, 16MB Direct3D-compatible video card, DirectX 8.0, DirectSound-compatible sound card
RECOMMENDED: 700MHz CPU, 128MB RAM, 32MB GeForce2, DirectX 8.0, DirectSound-compatible sound card. Leather trench coat
SOUND APIs: DirectSound
VIDEO APIs: Direct3D

DEVELOPER: Remedy www.remedy.fi
PUBLISHER: Take 2 Games www.take2games.com
God Games www.godgames.com
DISTRIBUTOR: Take 2 Interactive www.take2games.com

atomic
8/10

Starfleet Command: Orion Pirates

You'd think George Soropos would be into slow-motion deep spacing . . .



Interplay makes a great interface, but clearly still hasn't come to grips with asteroids.

In the film *Starship Troopers*, the aliens are referred to as 'bugs'. This is because they are big, nasty-looking insects. Taldren's Starfleet Command titles are also full of aliens, and lots of them. Fans of the previous titles (that is, people with the patience of a saint) will know what to expect by now. Others should tread warily. Let's just say this: Starfleet Command 2 (SFC2), this game's progenitor, is still being patched!

It's not often that a developer still in the process of fixing one game will actually release a sequel to it. In fact, we can't remember it ever happening before. That's Star Trek for you – build up enough fanaticism and profiteers think the fans will grab anything, and some of them will. This sort of thinking has lead to the release of some pretty nasty Trek titles over the years, along with far too many Pokemon toys and *Big Brother* spin-offs, but that's another story.

That isn't to say that the Starfleet Command series has been a bad one in concept. The idea of detailed tactical starship combat is a great one, and now that SFC2 is up to patch 2.0.0.6 (with 2.0.07 on the way), it's finally playable and able to be enjoyed – only a year after release!

In Orion Pirates the player can take command of any of the races in the previous games, but also has the opportunity to play as one of eight pirate clans. The clans all have their own hybrid ships made up of bits of other races' technology. Each clan employs slightly different approaches to combat, and designs their ships accordingly.

One of the key differences in this instalment of SFC is that it includes over 40 new scripted missions, providing richer and more varied single-player gameplay than previous titles. There is also a new Galactic map that shows pirate influence as well as Empire influence over territories. The map also determines who you are taking action against. If you attack a hex in Empire view, then you are attacking the Empire which owns it. If you do the same thing in Cartel view then you are attacking the pirate clan that owns it.

Unfortunately, Orion Pirates has also inherited some genetic defects from its predecessor, which provide some remarkable and lamentable similarities. The game still crashes out to Windows at random, slows down as you play further and further into the story and, worst of all, still allocates Prestige points in a totally ridiculous manner.

Prestige points are the currency in SFC; you use them to buy, repair and equip your ships. However, because these points are allocated the same way throughout the game, it is impossible to maintain a large fleet. Two hundred Prestige points per mission may be fine to keep a little frigate running, but to get the same points when you have a fleet of three Heavy Carriers is ludicrous. The only way to make the game playable is to modify certain files that change point allocation and the costs of maintenance. If you're not confident doing that, then the game is not really even playable, not for long.

One of the strengths, or perhaps weaknesses, of the series has been its loyal following of modders and ship designers. Some would tell you that the best SFC experiences can be had with the very first incarnation of the game, as it has the most number of good mods available for it. Some SFC2 mods will work with Orion Pirates. We tested a few modified ship types, but a lot of the modders will have to start from scratch. Maybe they will, or maybe they'll just keep working on SFC2. When a developer has to rely on its paying customers to make its game worthwhile, it doesn't really deserve such loyalty.

GAME DETAILS

FOR: 40 new scripted missions, new weapons and ship classes

AGAINST: Same bug problems as earlier titles, Prestige point system nonsensical

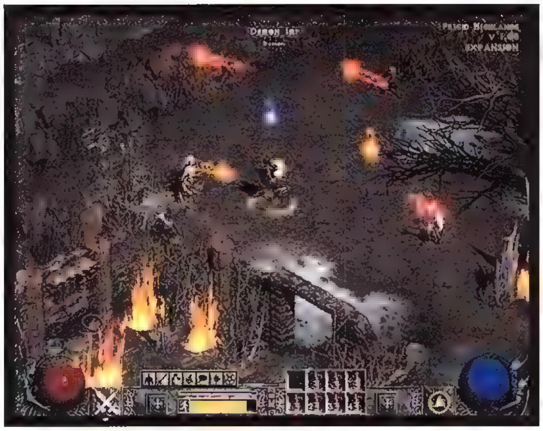
MINIMUM REQUIREMENTS: Pentium III 300MHz, 64MB RAM, 550 MB HDD, DX-certified sound
RECOMMENDED: Pentium III 600MHz, 16MB
SOUND APIs: Direct Sound
VIDEO APIs: Direct 3D

DEVELOPER: Taldren www.taldren.com
PUBLISHER: Interplay www.interplay.com
DISTRIBUTOR: Interplay www.interplay.com

atomic
6.5/10

Diablo II: Lord of Destruction

Click-happy John Gillooly delves into the expansion from hell.



Existing Diablo II characters can be 'upgraded' to work with the expansion, allowing you to take your old favourites through the new Act 5.

Expansion packs are an arcane artform, conceived back in the mists of time before the Internet was mainstream, when someone decided 'Hey, if we make a few more maps we can sell 'em and make more money'. This led to a wide range of 'expansions' from the simple to the bizarre. There are a few that actually do contribute to furthering the gameplay experience, such as Opposing Force for Half-Life. Then we have the boring, 'grab for more money' attempts like the Blood 2 mission pack.

Diablo II: Lord of Destruction (LOD) is an amazing achievement. The pack includes a new act set in the Barbarian Highlands after the defeat of Diablo, plus the trademark jaw-dropping Blizzard cut scenes. LOD also adds two new characters to the game – the Druid and the Assassin – as well as class-specific items, runes, new monsters and a whole host of tweaks and improvements. Also added, finally, is support for high resolutions. Okay, not too high, but the game now supports 800 x 600, which reduces the immense feeling of waste when using a 19in monitor.

I am still amazed by the unique ability that Diablo II has to destroy hours, if not days, of your life. There is something almost therapeutic about the constant rhythmical clicking of the left mouse button that constitutes the majority of gameplay in Diablo II, and LOD provides for many more hours of fun. There are a lot of subtle changes in the pack; Jewels and Runes are now available to place into socketed items alongside the much more frequent Gems (a change that was introduced in the 1.08 patch). There are also new Horadric Cube Recipes, and the ability to create special Rune items by putting runes into a socketed item in a certain sequence.

The new characters have a lot of scope for play. I chose the druid, and rather than investigating the summoning and spell-casting side of the character, I concentrated on creating the most bad-ass Werewolf out there. The Druid has the ability to shape-shift into either a Werewolf or Werebear, allowing for some seriously nasty hand-to-hand battles. He can also summon animals and use the forces of nature to his advantage. The Assassin is focused on martial arts; he's a hand-to-hand fighter who can draw upon magic-charged traps and psychic skills for help.

For long-range support, Blizzard has thankfully allowed more control over hirelings, who were nothing more than cannon fodder in the original game. They now have the ability to level up with you, as well as a limited ability to be equipped with weapons, armour and helmets. If they die they can be resurrected at a hefty price. This adds a whole extra level to the game, and hirelings can now really hold their own against the hordes of enemies.

One thing that Diablo II has always had in its favour is replayability, partly due to the mindless clicking that constitutes the gameplay, but also due to the increasing challenge and reward that comes from playing back through the game on Nightmare and Hell difficulty levels. The inclusion of a fifth act extends the depth of the game for both new and existing characters. Through a one-way conversion you can change existing characters into expansion-compatible characters, so your Level 60 Paladin can attain a new lease on life, and benefit from such things as the new class-specific items.

Lord of Destruction raises the bar for expansion packs in so many ways. It both complements and extends Diablo II for the better, and breathes new life into the game. The pack permeates the entire game, enhancing and extending the gaming experience. For both addicts and those who want to return to the Diablo II experience, this should satisfy. And it once again proves why Blizzard is held in such high regard by the gaming community.

atomic
9/10

GAME DETAILS

FOR: Adds huge depth and scope to the game, higher 800 x 600-pixel resolution, new items and characters, a whole new act

AGAINST: Limited 800 x 600 resolution, the innate ability to destroy your social life

MINIMUM REQUIREMENTS: Diablo II, 233MHz CPU, 64MB RAM, 800MB HDD (plus the Diablo II install)
RECOMMENDED: 500MHz CPU, 128MB RAM, 800MB HDD, Direct3D video card,
SOUND APIs: DirectSound, EAX
VIDEO APIs: DirectDraw, Direct3D, Glide

DEVELOPER: Blizzard North www.blizzard.com
PUBLISHER: Vivendi www.vivendi.com
DISTRIBUTOR: Vivendi www.vivendi.com

Sonic Adventure 2

Kevin Cheung reviews the last great Dreamcast game.

Sonic Adventure 2 will be a hallmark platform game for most fans of the genre, but not for the reasons you'd expect. Whereas Mario 64 heralded the entry of Nintendo's 64-bit console into the games market, Sonic Adventure 2 marks the end of the little blue hedgehog's run on any Sega console, at least for the foreseeable future. From this point on, Sonic will appear on other consoles, starting with Nintendo's Game Boy Advance and the upcoming Gamecube.

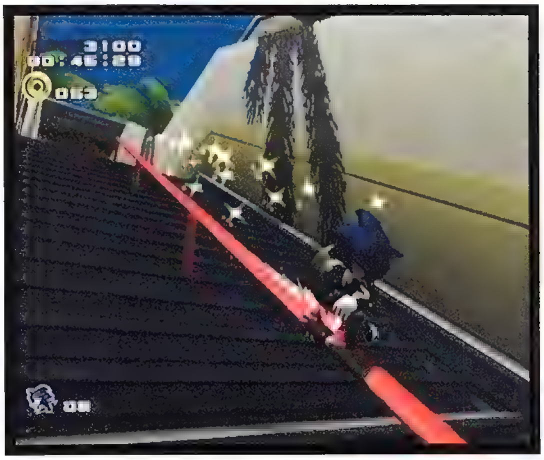
This latest chapter in the Sonic saga sees the hero framed for a series of nasty crimes. It all comes down to a case of mistaken identity, though. The real villain is a new character named Shadow, a black hedgehog that looks like an evil version of Sonic, but runs ten times faster. He's also Dr Eggman's new errand boy for stealing the Chaos Emeralds. Joined by a supporting cast that includes Tails, Knuckles and Amy, Sonic's quest becomes yet another race against Eggman to recover all the Chaos Emeralds.

Alternatively, players can choose to align themselves with the 'dark side, so to speak, and play the game as the bad guys. That is, you get to play as Shadow, Dr Eggman and a couple of other villains. There's some revoltingly cheesy literary ploy at work here, contrasting the elements of light and dark. But for most people, this will add more variety to the gameplay.

Sonic Adventure 2's design goes back to its roots as a platform game. Rather than opting again for the Mario 64-inspired 'overworld with levels scattered everywhere' design, this game is played one level at a time, with each level separated by video sequences that narrate the story. As the game progresses, you'll unlock extra characters like Mecha Sonic as well as several extra game modes such as Kart Racing and the Boss Challenge.

Like the first game, Sonic Adventure 2 is an impressive game to watch. Despite the sometimes wooden character animations, the huge 3D environments are sumptuously detailed with crystal-clear textures. There are many different locations, which make for a diverse range of visual styles. There are jungles, military bases, Egyptian temples, underground caves, and so on. Mind you, some of the narrative that connects these locations won't make one iota of sense (like travelling into space via an Egyptian pyramid).

The game is at its best when Sonic and friends are running at a blinding speed through these levels. Anything else, and Sonic Adventure 2 seems to stumble over itself. Each character has a unique gameplay style such as flying, digging or shooting. Sonic and Shadow are actually the only ones who do any running. The rest usually involve a great deal of Mario 64-style interactivity, like hunting for switches or secret passages, and bouncing around between awkwardly placed platforms.



The beloved blue hedgehog, Sonic, makes his final appearance on the last of the Sega consoles, and dashes off to unknown destinations.

The problem is that the design and interface actively discourages exploration. Camera controls are awfully weak and don't allow you to view everything around you, especially when you're up against a wall. Characters like Tails and Dr Eggman are limited to running around in their mecha-units, with gameplay revolving heavily around avoiding those 'bottomless pits of instant death'. For Knuckles, whose level designs resemble Mario 64 more than any other character, levels are prone to massive amounts of pop-up, which makes it hard to learn the stage by sight alone.

There's also an inherent lack of versatility in the level designs. In the first Sonic Adventure, players could use any character in any level. In Sonic Adventure 2 you're stuck with the designated character – not that Tails will be missed.

With that in mind, Sonic Adventure 2 is something of a misnomer, as there are significantly less adventure elements than before. This game is more like a rendition of the original Megadrive games: a linear sequence of levels that require speed, twitch reflexes and a natural sense of direction.

GAME DETAILS

FOR: Top-notch graphics and sound, decent game life (over 30 levels) and replay value

AGAINST: Infuriating camera problems, some heavy pop-up and inflexible level designs

MINIMUM REQUIREMENTS: Control pad
RECOMMENDED: Control pad, VMU, vibration pack

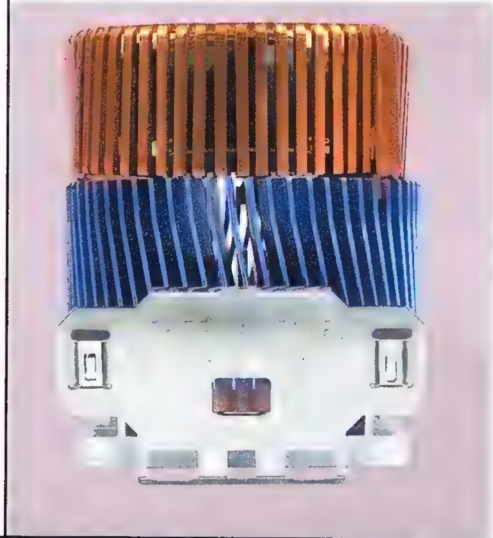
DEVELOPER: Sonic Team www.sega.co.jp
PUBLISHER: Sega www.sega.co.jp
DISTRIBUTOR: OziSoft (02) 8303 6800

atomic
8/10

1337 Tr0ublesh00txOr

Daniel Rutter is a man of great patience and deep understanding. He is happiest when your PC is cactus and he can save you.

For being unable to eliminate the obvious, Andrew Wright scores the following funky kit from CoolPC (www.coolpc.com.au): Dragon Orb 3, Digital Doc 5, Silverprop Cyclone Waterblock, Arctic Silver



Stress of the Month: Flamin' FSBs

i I recently decided to upgrade an old Celeron system I have been using for a while.

Having read the hype on the performance of AMD chips, and interested in having a shot at overclocking, I have been collecting the necessary equipment and am ready to complete the upgrade. I have an MSI K7T Turbo ATX motherboard, a 128MB PC133 SDRAM module and a 1.2GHz CPU/266MHz FSB Athlon.

My confusion started when I was looking at the jumper settings on the motherboard. Jumper 17 is the 'CPU Front Side Bus Frequency Selector'. No problem – my FSB is 266MHz. But, lo and behold, the only settings are 'For CPU FSB 100MHz (DDR 200MHz)' and 'For CPU FSB 133MHz (DDR 266MHz)'.

As an enthusiastic beginner who does not have DDR RAM, I cannot eliminate the obvious, and am consequently seeking a clarification/explanation.

Problem two relates to overclocking the CPU. Based on an article in the first issue of atomic, to establish the multiplier setting you divide the processor speed by 100. Hence, a 1.2GHz processor has a multiplier of 12. The Frequency/Voltage Control settings in the BIOS have a setting called 'CPU Clock Ratio'. The range shows as 5.5-12.5.

I'm assuming that the overclocking ability on this motherboard is somewhat limited, and completely nonexistent for anything over 1.2GHz, even though the board is rated up to 1.5GHz.

What's going on?

Andrew Wright

o Athlons and Durons use the 'EV6' bus that was originally developed for the Alpha CPU, and have a CPU-to-motherboard-chipset speed that's faster than the motherboard chipset-to-other-motherboard-stuff speed. They can thus be said to have a 100, 200, 133 or 266MHz frontside bus speed, depending on which side of the clock-doubling you measure it, and whether you're using an older 100/200MHz Athlon or a newer 133/266MHz one.

In this case, you want to use the 133/266MHz speed. If you use the 100/200MHz setting, your CPU will work, but only at 900MHz.

If you're only running a 100MHz pre-doubling FSB, then a multiplier-adjusted motherboard will indeed only let you run at a top speed of 1.3GHz – not 1.25GHz, as you might expect from the 12.5x maximum multiplier. Current Athlons actually interpret the 12.5x multiplier setting as 13x. Your 133/266MHz 1.2GHz Athlon, though, has a stock speed of 9 x 133MHz (133 and one third, to be exact) – not 12 x 100. That's why it will run at 900MHz with the 100MHz FSB setting. If the CPU can take it – which it probably can't – you can run that CPU at 13x (with the 12.5x setting) for a 1733MHz core speed.

Your CPU is actually likely to hit its top reliable speed somewhere below that. But 1.4GHz is plausible enough, depending on the exact flavour of Athlon you have, the voltage you run it at, the quality of your CPU cooler and the exact number of Boy Scouts you offer to the insatiable Sarlacc.

Some sources say six will do, but if I were you I'd play it safe and offer at least ten.

Situation normal, all FDISKed up

I'm trying to use the Windows 98 FDISK program to delete partitions on a hard drive I got from a friend who uses Linux. I just want it to be one big partition, but I can't seem to do it.

The drive's got an Extended DOS partition on it, which FDISK won't delete. It says 'Cannot delete Extended DOS partition while logical drives exist'.

But when I try to delete logical drives on that partition, FDISK says there aren't any!

Pete Bath

You can delete Linux-created partitions by using the Linux FDISK program. Yes, yes, I know. You don't *have* the Linux FDISK program; you've got the Windows one.

Well, you can download a Linux boot disk file and extract it to a floppy and blah blah blah, but there's a simpler way. Use the secret command line options that Windows FDISK doesn't tell you about.

Try typing the following commands, assuming the drive you're working on is the first IDE device. If it's some other number, change all of the '1/' stuff appropriately to:

```
FDISK 1/PRI:100
FDISK 1/EXT:500
FDISK 1/LOG:250
```

What you've just done is trampled in a new 100MB primary partition – whether there's room for it or not – followed by a new 500MB extended partition, on which you've put a 250MB logical drive. If you try to format any of this new stuff you'll be wandering over the existing partitions, but you don't care about that.

Now, if you run FDISK normally and use the menu interface, you'll be able to delete logical drives on the mystic Linux extended partition, then delete the partition itself, then delete any other partitions, then make one big FAT32 partition to fill the drive.

Athlon ID

My son (the genius) assures me we have an 850MHz Athlon Thunderbird in our system. The BIOS only states an 850 Athlon. The dealer that built it says it's only an 850 Athlon.

The motherboard is a Gigabyte 7IX-E4, and supports AMD-K7 and Duron. Is there any way of easily detecting what type of processor it is?

Also, having established the type, what would be the simplest and easiest way to overclock the performance for any option (CPU, FSB, RAM) for the best results?

The system was built around five months ago with 128MB of 133MHz RAM, a 20GB hard disk, CD burner, CD-ROM drive, sound card and TNT2.

Michael O'Hare

All Socket A Athlons, as I write this, are Thunderbirds. The new Palomino-core Athlons (the 'Athlon 4') are just coming out now, but the pre-Thunderbird Athlon was the Slot A model with separate level-2 (L2) cache chips.

There are Thunderbird Slot A Athlons (with no L2 cache chips), but there are no pre-Thunderbird Socket A Athlons. They can all be broadly referred to as a 'K7', because that was AMD's codename for its processor after the Pentium-socket K6, but practically nobody calls them that. 'K7' shows up a lot in motherboard names, though.

The 7IXE4 has a bit of FSB adjustment capability – to 115MHz, I think – but it probably won't manage even that much, and that's it for overclocking on this board. No multiplier adjust, no RAM twiddling.

If you want better performance for games, try a new graphics card. A Kyro II or GeForce2 MX card would go well with your PC.

Light life

I have been thinking about installing a neon light in my case after reading all of those excellent articles that you have been publishing about modifying cases. I have one concern, though: how long will an average neon light last? I don't want to go out and spend all of that hard-earned dosh only to find out that they die after 1,000 hours.

Duds Na

It depends somewhat on the kind of 'neon' light you're using.

If a gas discharge lamp isn't some shade of red, orange or pink, then it's not filled with neon. And pretty much any other colour these days will have the same mercury/argon filling as a household fluorescent lamp. Different lamps have different lifespans but, generally speaking, you can count on several years of life from any gas discharge lamp – if it's a decent quality unit.

Most PC modifiers who install 'neon' end up using cheapo car decoration tubes, because you get a simple integrated 12V power supply built into them. These things are not necessarily well made, and the novelty types – bi-colour, 'lightning', and so on – may have power supplies that are more likely to die.

A dead power supply, for these purposes, is almost as bad as a dead tube. There's no way for anybody who doesn't know basic electronics and own a soldering iron to replace either item.

Speed safety

Do you think it is safe to run a Pentium II 350MHz on a Slot 1 Gigabyte 6BXC board, overclocking to 468MHz via a 133MHz FSB? I'm currently running a system like this with only standard cooling. Also, is it safe to use my PC100 SDRAM, or should I buy some PC133 SDRAM?

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17'5 |>3|2|>|-|3C7|_`/ 54|>|-|3 . . .

Oh, wait. I think my l337-Lock key was stuck down, the same way yours was when you typed your name. Let's try that again.

It's perfectly safe to run your CPU and memory faster than their stock speed, *provided* you're not running anything so fast that your computer doesn't work properly. If your computer hangs – which is almost always what happens when your CPU is excessively overclocked – then you can lose data.

This is pretty much a non-answer, of course, but if you're worried about your CPU slowly burning up and then dying forever, don't be. Yes, running it faster than stock can only shorten its lifespan. But if the CPU's life is shortened from 10 years to, say, only five, then you're not likely to care anyway. You're probably not going to still be using that processor in another two or three years, whether it works or not.

Vanta versus G100

Curently I'm running an NVIDIA Vanta LT video card. I know, not the greatest card around, but I also have a Matrox G100a and was wondering how they stacked up together. I would ultimately like to run two monitors and was wondering what the Matrox Marvel G450 eTv card was like. Is it good value, or is there something better at around the same price or less?

Brad Morris

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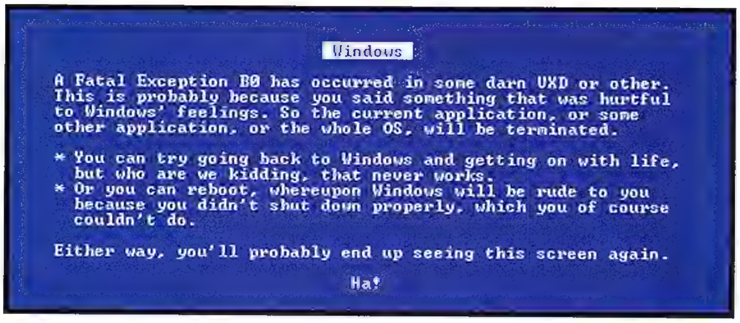

```
                         Windows

A Fatal Exception B0 has occurred in some darn VXD or other.
This is probably because you said something that was hurtful
to Windows' feelings. So the current application, or some
other application, or the whole OS, will be terminated.

* You can try going back to Windows and getting on with life,
  but who are we kidding, that never works.
* Or you can reboot, whereupon Windows will be rude to you
  because you didn't shut down properly, which you of course
  couldn't do.

Either way, you'll probably end up seeing this screen again.

                           Ha!
```

BSODs sure can be a bother!

The G100 is a perfectly good 2D graphics card. But when it came out in 1998, its 3D performance was already lousy. Your Vanta's not a terribly exciting 3D card, but it beats the heck out of the G100.

As far as 3D speed goes, Matrox G400 and G450 boards all perform like an NVIDIA TNT2. That's a *proper* TNT2, not the cut-down Vanta. But it's still far behind the cutting edge for 3D games.

Apart from that, though, the Marvel G450 is a nice card if you want quality TV in and out, video capture and playback, and decent software to drive it.

If you want to run two monitors from one video card, though, the Marvel G450 won't let you do it. It's got a monitor output and a TV output. You can use them both at once, and you can wrap your Windows desktop onto the TV and do other multi-screen tricks, but TVs are not good computer graphics display devices. Matrox's other 'DualHead' cards, with twin monitor outputs, might be suitable.

Cards that use the NVIDIA GeForce2 MX chipset with dual monitor outputs (which Nvidia calls 'TwinView') have much better 3D performance than the G400 and G450 boards, and cost about the same. But its drivers aren't as elegant as Matrox's for multi-monitor use.

RAM shambles

When I installed a new 128MB PC133 SDRAM module, Windows wouldn't start any more, giving me blue screen errors. The 64MB memory module I had already has worked fine for a couple of months, and when I took the new module out again, everything was OK again. The weird thing is that if I install only the 128MB module, the PC also works perfectly!

My motherboard supports PC133 memory. The problem only happens when I install both modules. Why is the computer crashing? How can I resolve this problem?

Leo Wong

The symptoms you describe are probably caused by a RAM compatibility problem.

Sometimes these happen because you're accidentally running one or more RAM modules at more aggressive timing settings than they can handle – motherboards ought to sort this out automatically, but sometimes don't.

Usually, though, memory-related crashes just mean you've got a couple of sticks of RAM that happen not to play well together. This is a common enough problem with cheap RAM.

Fortunately, all SDRAM is pretty darn cheap these days, which makes replacing dodgy modules a much less painful procedure than it used to be. A quality PC133 256MB Hyundai module will, as I write this, now cost you little more than $100. It'll probably be even less by the time this magazine's been printed.

And today, your error will be . . .

I have a fairly old computer: a Pentium 200MHz MMX with 64MB RAM. It's giving me slightly annoying BSOD errors that say 'There are no spare stack pages. It may be necessary to increase the setting of "MinSPs" in SYSTEM.INI to prevent possible stack faults. There are currently 5 SPs allocated. Press any key to continue.'

What does this indicate? How can I fix the crashing problem?

Angelica Leong

What does this indicate? It indicates another of the irksome resource limits that lurk beneath the surface of Windows 95-series operating systems – including Windows Me – no matter how much RAM you give 'em.

This particular problem is probably caused by a flaky device driver, and you can work around it by assigning a little more memory to be used for spare stack pages. You need to edit SYSTEM.INI to fix the problem, and how to do it and what to change is covered on Microsoft's support page at http://support.microsoft.com/support/kb/articles/Q149/0/83.asp.

Aleister Crowley computing

I am currently running a Pentium 3 667MHz, and for novelty reasons I wish to underclock it to a 666MHz. This would be cool, as I could then attach some horns and a pitchfork to make it a 'hell' of a machine. Excuse the pun.

Kenton Erb

Your motherboard, whatever it is, won't have fine enough FSB adjustment resolution to make this possible.

The CPU speed that's displayed when you start up the system is how fast the motherboard *thinks* the Pentium III should be running – given the multiplier the motherboard thinks the chip uses, and the FSB the motherboard thinks it's delivering.

You can fool with the multiplier setting as much as you like with all Intel chips since the early Pentium IIs without making any real difference, as the multiplier is actually internally locked. And the frequency spat out by the motherboard's clock generator doesn't necessarily quite line up with the speed you asked for, either.

If you have a motherboard with small frontside bus adjustment increments, feel free to tweak the FSB up and down a little, and use a program like WCPUID (from http://www.h-oda.com) to see how fast your CPU ends up running.

But you're not ever going to get a '666MHz' bootup speed display, unless there's a '133.2MHz' FSB option for your board.

[redacted]

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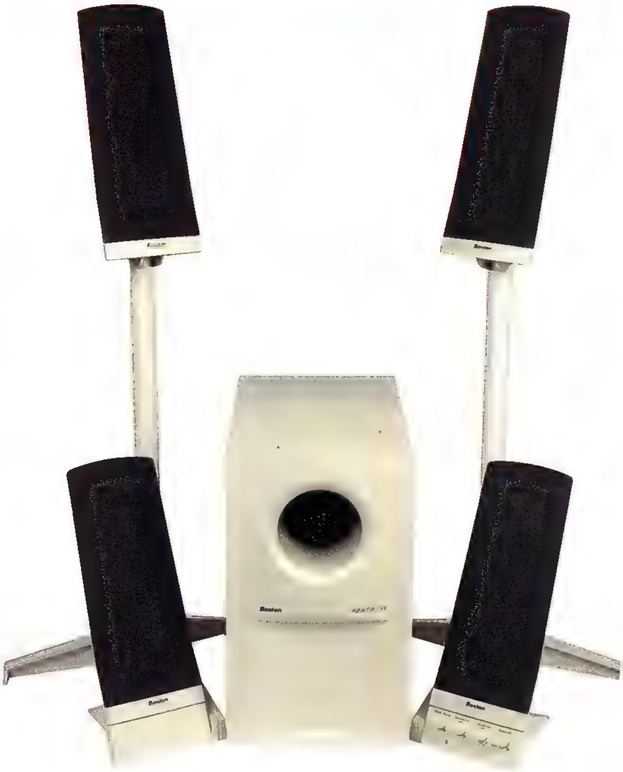

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Creating the GeForce3 Ultra

Wring an extra 30% performance out of your GeForce3 with Bennett Ring.

Remember the halcyon days when NVIDIA released a new product every six months? Ever since the demise of 3dfx, this release schedule has slipped to a yearly product cycle, as NVIDIA takes a much needed break while the the rest of the industry struggles to catch up. Well, we couldn't wait for NVIDIA to introduce the GeForce3 Ultra, so we made one ourselves!

Overclocking an NVIDIA video card is generally much easier than overclocking your CPU. Simply install NVIDIA drivers that have the overclocking features enabled, and then start sliding the core (graphics processor) and memory speed sliders above the default speed. This can only take you so far, however. Just as with CPU overclocking, you won't get much of an overclock unless you start increasing the voltage that is supplied to the core and memory. So we're going to show you how to increase the voltage that is supplied to the memory and core components of the GeForce3, and end up with a card that performs over 30% faster at higher resolutions than the standard GeForce3! This puts it at the same performance levels we could expect of the unreleased GeForce3 Ultra.

Thanks to AusPC Market, www.auspcmarket.com.au, for supplying the card cooler.

It must be said that this is perhaps the most difficult modification we have covered in atomic. What makes it so difficult? Well, unless you're used to soldering additional resistors on to $1,000 video cards, you might find the soldering task in this article a little daunting. So get a pro to do the job for you. Also, if you don't set the potentiometers to the correct values, you could fry your core and memory before you can say 'I smell something burning'.

Step 1 - Resistance is futile

After attaching the multimeter to the top and middle pin of each potentiometer, set two of the potentiometers to 820 ohms, and the final to 510 ohms. Label each so you know the value of them when you affix them to the video card.

Step 2 - Core Voltage

The first voltage we'll adjust is the core voltage. The chip we'll be modding is the SC1175CSW microchip that is in the top-left corner on the rear of the video card. On the standard GeForce3, this microchip supplies the core with 1.45V. After adding our extra potentiometer, this is increased to approximately 1.78V, giving the core an additional 23% juice. Solder one wire to pin 20 of the SC1175CSW microchip and the other end of this wire to the top pin on the potentiometer you set to 510 ohms ①. Solder another, separate wire to pin 18 of this SC1175CSW and then solder the other end of this wire to the middle connector on the 510-ohm potentiometer ②. Fix the potentiometer in place on your card in the same position we have, using Loctite adhesive.

Step 3 - Memory Voltage

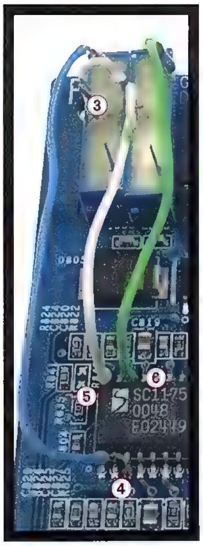
Now it's time to adjust the voltage going to the memory of the GeForce3. There is another SC1175CSW microchip on the rear of the card, but this one is located on the opposite end of the board as the SC1175CSW used for the core. Normally this chip supplies the memory with 3.3V for all internal circuits, and 2.5V for the input/output buffers. After adding our two 820-ohm potentiometers to this chip, the internal circuit voltage is increased to approximately 3.64V, while the input/output buffer voltage rises to 2.8V. As we will be directly linking both of these resistors together, as well as to the memory voltage, it is best to stick the two potentiometers to the board before you begin soldering. Place them side by side with the trim pots (the adjustable screw on one end) towards the top of the card. Once they are in place, join both potentiometers at the middle pin with a small piece of wire ③. Then solder a separate piece of wire from pin 3 of the voltage controlling chip to the top pin on the left-most 820-ohm potentiometer ④. Attach another wire from pin 20 of the chip to the middle pin on the rightmost 820 ohm potentiometer ⑤. Finally, attach the last wire from pin 18 to the top pin of the right-most potentiometer ⑥. If that sounds a little too confusing, the photo should make it all clear.

Step 4 - Running hot is not cool

Because we are now supplying the GeForce3 video card with additional voltage, the core and the memory will both run at a higher temperature. Unless you get a kick out of flushing money down the crapper, you need to add extra cooling to your video card. Our solution was to use the beast of a cooler you can see in the photo. This kept the memory nice and cool, but unfortunately the core remained hot. The guys over at X-bit Laboratories removed the heatsink fan from their GeForce3 and were able to wring an extra 40MHz out of their core as a result. So the message is, the cooler you get it to run, the more you'll be able to overclock it.

Step 5 - Feel the power

Reinstall your modded GeForce3 with its additional cooling and fire up your PC. Install your preferred version of NVIDIA's Detonator drivers, making sure they support overclocking. Enable the overclocking features of the drivers using Coolbits or the infamous reg hack, and start winding the sucker up. Start with 10MHz increments, slowly adjusting both the core and the memory, before running an extended benchmark. We usually run 3DMark2001 in looping demo or benchmark for an hour to test stability. If the benchmark doesn't crash or display artefacts (small glitches in the displayed graphics), wind it up another 10MHz. Keep

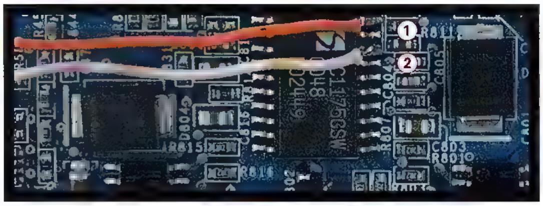


repeating until you find the ceiling for your card.

After following these steps, we were able to wind our GeForce3 core up to 240MHz and the memory up to 570MHz. This is a pretty hefty overclock considering the default speed for the core is 200MHz and the memory normally runs at 460MHz.

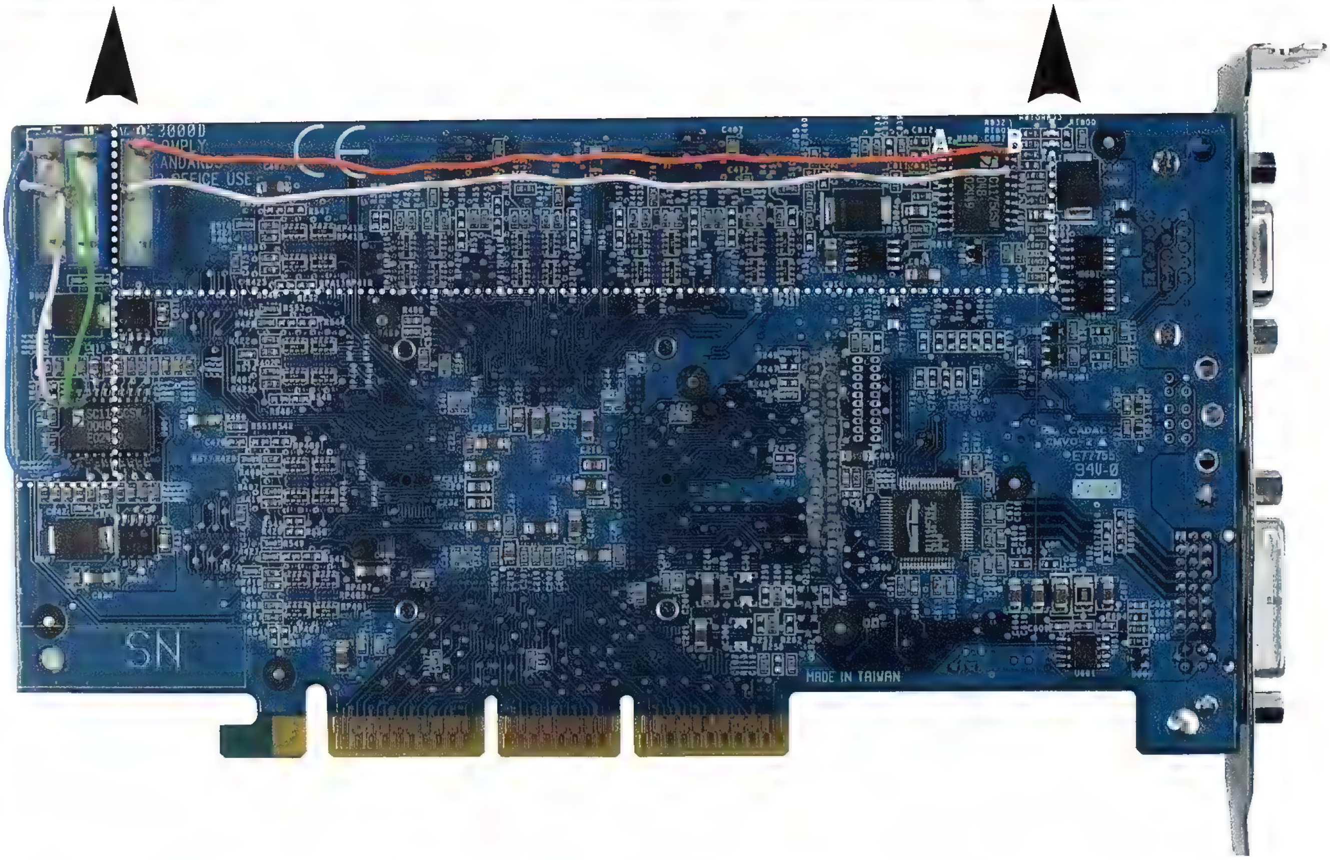
Some people have managed to get their GeForce3s up to an extraordinary core speed of 270MHz, while the memory reached 600MHz. These GeForce3 cards tended to be more expensive GeForce3s with better RAM and heatsinks than our Gigabyte card.

We tested using both 3DMark2001 and Quake 3: Arena, with a focus on high resolutions at 32-bit colour. The benchmarks were run with the overclocked GeForce3 and the same card clocked at the NVIDIA default speeds. At 1,024 x 768, both benchmarks noted a speed increase of between 12 and 18%, which isn't too bad. However, at 1,600 x 1,200, the Quake 3: Arena test flew 32% faster on the overclocked GeForce3. This is the kind of performance increase you could expect from a GeForce3 Ultra. Not bad for a modification that only costs $50 or so.



ⓘ A close-up of the memory and core voltage space mods.

ⓘ A pin 1
B pin 20



What you will need:

- 3 potentiometers (variable resistors) 0 to 1K ohm
- Solid core wiring
- Multimeter
- Soldering iron with extremely fine point
- Loctite adhesive
- Additional video card cooling

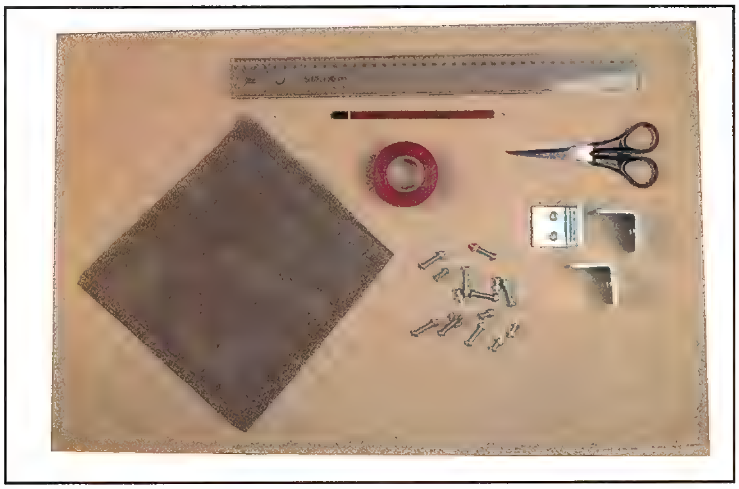
Difficulty

Russian rocket scientists

First things first. We absolutely must credit those zany Russians at X-bit Laboratories for the research behind this tutorial. We stumbled upon their article about voltage modding the GeForce3, and after a few expensive ISD calls and a couple of airmailed cartons of vodka, they kindly gave us permission to use their research as the basis for this article. We modified the procedure somewhat, to make things a little more tidy and adjustable. Head on over to www.xbitlabs.com to see what they get up to next.

Cool & quiet: Advanced case modding

Matt Overington goes beyond neon and perspex to the next logical step – copper and foam.



TOP: The necessary ingredients.

TOP RIGHT: Lining up the baffle mounts.

While it isn't too much of an issue at the moment (depending on how warm your room heater is set at), summer will soon be upon us, and system instabilities from overheating stand a good chance of returning to a PC near you. Cooling requirements of modern CPUs, graphics cards and other PC gubbins are intense, and to get the most out of your high-end pile of silicon, gold and copper, you need to carefully modulate the temperatures within your PC, especially if you are going to be dabbling in overclocking.

Aluminium cases look stunning and are efficient at cooling the components contained within, as aluminium is an excellent thermal conductor, but they are generally expensive. And after spending a large amount of money on PC components the last thing that you need is to spend a few hundred dollars on a case. By using some spare time and ingenuity, you can create a case that will run even cooler than your average boutique box, and at substantially less cost.

In atomic 6 we showed you how to go all out and install a radiating water cooler in your machine. While this is the ultimate way of keeping your PC cool (short of buying a small bar fridge and bolting the motherboard, PSU and hard drives to the inside walls of the refrigerator), it is a little over the top for most people, and it is not inexpensive – the parts alone stand to set you back a three-figure sum. One atomic contributing writer has actually attempted the fridge PC, but it's not necessarily a good idea unless you live in an environment with extremely low humidity, or are savvy to the issues of condensation and frost forming on your refrigerated PC components. Nor is the exercise cheap.

It is perfectly straightforward to build an efficient heat reduction system for your machine without resorting to these desperate but undeniably cool measures (pardon the pun). All you really need access to is an electronics supply store, a hardware store, a drill, pliers and, if you want to get really silly, a machine shop . . . Fans can be purchased from an electronics supply store, such as Jaycar Electronics or Dick Smith Electronics, and will only set you back a few dollars. All the other components that we have used in this tutorial have been (cheaply) sourced from hardware supply stores. After all, it's more important to put your money towards buying PC components rather than customising your case.

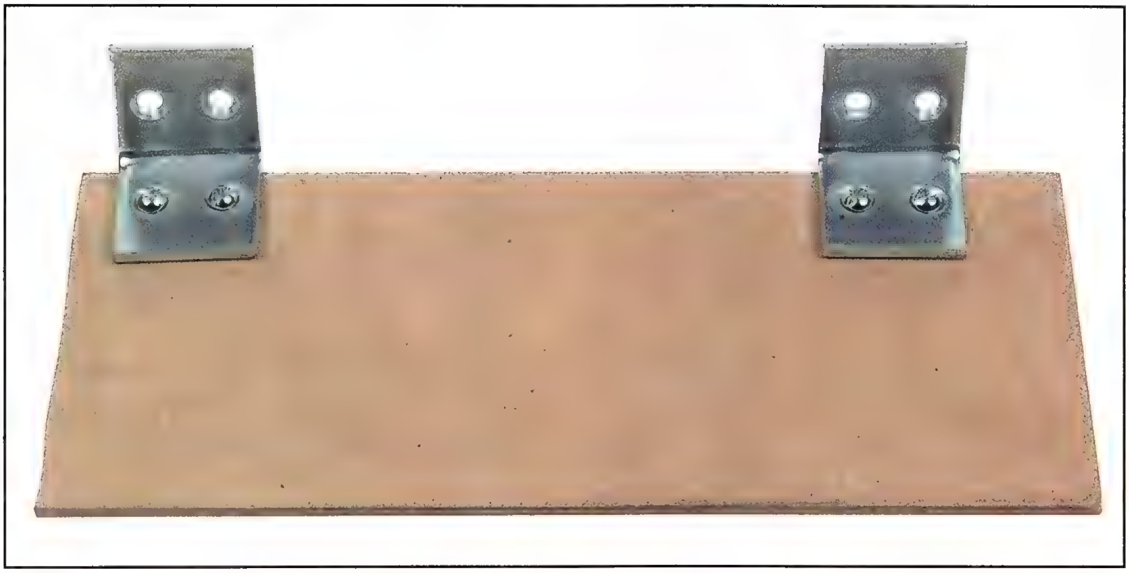
Are you baffled?

Many of us run our computers without cases on them at all. While this is an excellent way to keep the computer cool, it is also a marvellous way to fill it up with ambient dust, as well as deafen yourself by the whirring of fans. It is not uncommon for a modern computer to have upwards of four fans – a PSU fan, CPU fan, a fan on your graphics card and probably a case fan – and all these are designed to move hot air from areas of your computer that generate a lot of heat. This is all well and good, but if you still have hot air moving around inside your case, then it's a moot point; the warm air that is

What you will need:

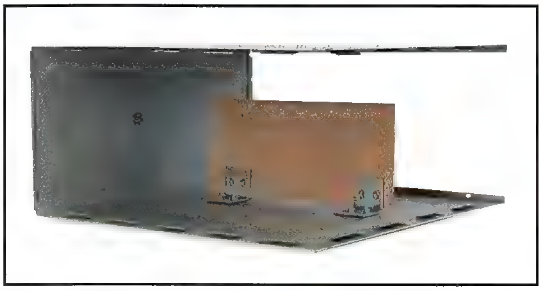
- **Saw**
- **Drill and multiple drill bits**
- **Ruler and pencil**
- **1 sheet of chipboard**
- **Wood glue**
- **Various screws and hinges**

Difficulty



A baffle with brackets attached.

removed from the surface of your CPU heatsink is only going to be replaced by warm air. Back in the 'ice box' issue, we showed you how to install a blowhole in your case, which is arguably the best way to increase the flow of cool air through your box. You can take this a step further, however, and install baffles within the case of your computer in order to direct airflow over components that are prone to generating a lot of heat (your CPU, graphics card and hard disks will generate the most heat). This is a technique borrowed from underground mining, where the flow of air is directed by opening and shutting vents on the mine surface in order to ventilate lower areas of the mine. While nobody is going to die if you get the ventilation systems in your PC wrong, your computer will run much cooler if you can set it up right. There are many good materials available, but we prefer either plastic ice cream containers or MDF board to make baffles, as they are both readily available and are extremely easy to work with.



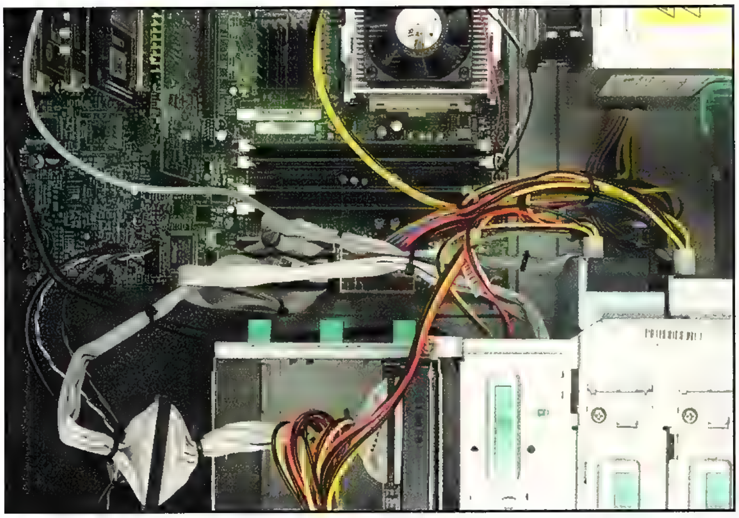
The baffle attached to the interior of the case cover.

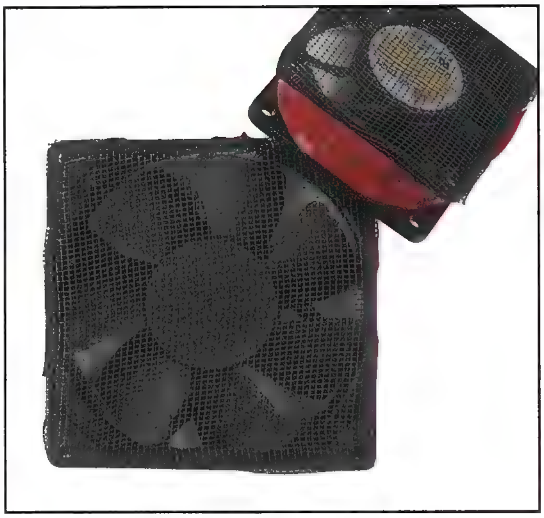
> **'While nobody is going to die if you get the ventilation systems in your PC wrong, your computer will run much cooler if you can set it up right.'**

Mount aluminium angle brackets to the inside of the left panel of your case (approximately above where your CPU heatsink sits) using double-sided tape, a bolt, or better yet, a pop rivet. Pop rivets are best in this application, because they tend to look the best when you have the cover on your case. Cut the plastic or MDF board to an appropriate size (so it reaches down and nearly touches the motherboard). Remember that you are trying to separate the inside of the case so that air flows around heat generating components in isolation, so it is important to construct the baffles so that they are effective in bisecting the case – they need to be long enough to allow only a couple of centimetres clearance above the motherboard. Usually a single baffle is enough to separate the drives from the CPU fan, but some case designs (particularly large ATX cases) will require you to add a second one to ensure that the heat generated by the drives doesn't linger in the case.

Suck or blow?

The next step is to add a blowhole to your case on each side of the baffles you've constructed, so that each segment within your PC case is cooled individually. Look at atomic 3 for detailed instructions on how to make a blowhole for your box. Basically it consists of cutting a fan-sized hole in the case of your computer and mounting a 12V fan behind it. Make sure you connect the wires from your PSU correctly (red is positive current, black is negative) so that the fan will spin in the correct direction – you want the fans mounted next to the baffles to ≥





TOP: No cable jungles here, folks!

TOP RIGHT: Fans with dust filters attached.

suck air through the computer, over the hot components. If you have enough room, it is always a good idea to complement each fan that sucks with a fan that blows. Mount the fan that is going to blow on the opposite side of the components to the one that is sucking, so that air will be pushed (and pulled) over the heat generating areas. A good place to mount a blowing fan is generally below the PSU, so that air is pulled into the box from the outside, then dragged over the CPU heatsink (and AGP graphics card) and sucked out the side of the case. Reverse the polarity of the cables from the PSU to reverse the fan – it will instantly turn a sucker into a blower!

Spaced out, man

Despite the fact that you're fairly limited in terms of where you can put CD-ROM/CD-RW or hard drives inside your box, there is a tendency to group them all together in the one area to give you lots of clear space around the motherboard. With old motherboards that required you to swap jumpers or DIP switches in order to overclock (or –gasp– underclock), making sure that you had clear access to switches on the motherboard was vital. Well, it was if you wanted to save hours of removing components, flicking switches, rebuilding and repeating the process until you found the perfect speed that your PC could run at stably.

Most modern motherboards enable you to perform changes to frequency and multiplier from within the BIOS, eliminating the need to dismantle your PC whenever you want to tweak it for a Counter-Strike session, therefore it is much less important to leave room for hands to get at motherboards within your case. Hard disks, CD-ROM/CD-RW drives and DVD-ROM drives all generate a large amount of thermal energy, so taking the time to space them out and ensure that there is adequate airflow around each component is a good start to dissipating the heat.

Isolate all your CD-ROM/CD-RW/DVD-ROM drives at the top of your case, in the top-most mounts that you can use. This not only gives you room to work, it also tucks the drives into their own 'section' within the case. These can even be individually baffled off and cooled if you so desire.

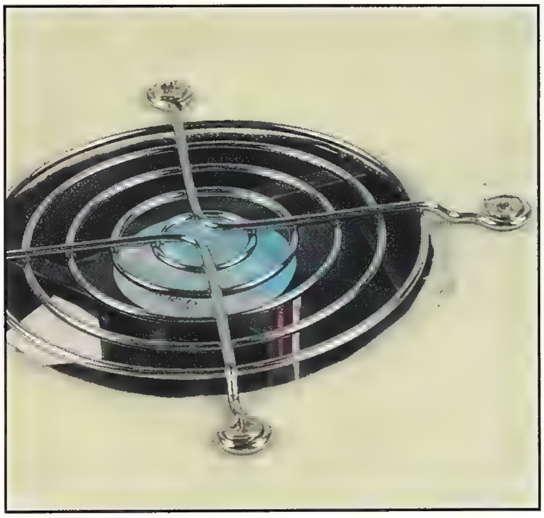
If you are anything like the atomic team, you probably have a few hard disks of varying sizes that you have collected over the years sitting inside your computer – what was once your primary boot drive has probably been relegated to a data drive, or even an MP3 repository. Mount the hard disks together as well. The best place is underneath your floppy drive, as it is near where most cases have a mount for a system fan to help cool things down.

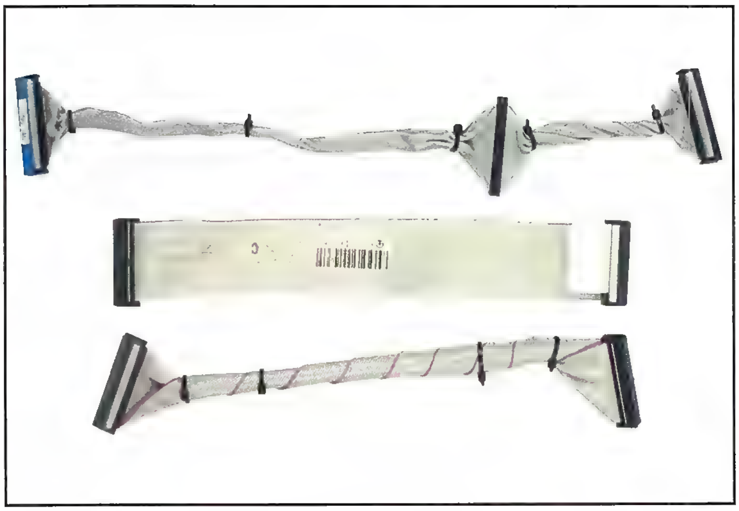
Dust filters

It's also extremely easy to install partial dust filters in your PC, although keep in mind that whenever you install a filter you will be slightly reducing the airflow through the case. If you want a computer that will run happily for years, then filters are the way to go, and you can always pop the top off your case and remove the filters at any time if you need to (you'd need to do so once every six months or so, as they tend to fill up with dust and gunk in a surprisingly short time). Plastic fly screen mesh can be purchased from any decent hardware store, such as Hardware House or Bunnings, and mounted on the inside of your case over your blowing fans using either zip-ties or electrical tape. We recommend electrical tape, as it seals the edges of the mesh. This means that all the air that is being blown through the screen, instead of slipping around the side of it.

Zip it, zip it real good

There are lots of other things that you can do to increase airflow within your case. Opening your box's lid will show you just how much of your case is taken up by cabling. Each of your IDE cables, floppy cables, power cables and switch cables take up space within your PC, and contribute greatly to restricting airflow. Think of each of them as a rock in a stream creating





disturbances in airflow simply by being there. While it is impossible to eliminate the cables from the inside of your machine (try getting anything to happen when you flick an unconnected power switch), it is quite simple to minimise the impact that they have on airflow and therefore cooling.

The first step is to buy a bag of zip (or cable) ties, and use them to bundle the cables together. First, focus on your power cables. If possible, tie them to any spare holes or loops inside your case. The main aim is to get all of the cables (or as many as you can) into one large, single bundle, as it will create fewer obstacles to airflow within the case when compared to many small cables.

The second step that you can take, which is even more effective than bundling the cables together, is to use round IDE cables (as opposed to the ribbon cables that are probably inside your computer now). You can buy pre-rounded cables for about $40 per set from most good computer stores, but it is vastly cheaper (and almost as effective) to round your existing ribbon cables.

Essentially, what you are trying to do is minimise the surface area of the cables, and this is done by either twisting or folding the cables and then fastening them with zip ties. For floppy cables and most 40-pin IDE cables, the easiest way to do this is to grab each end of the cables and twist them relative to each other. After two dozen or so twists, you should have a tight tube of cable with a connector at each end. Use zip ties near each connector and in the middle of the roll to hold it

≥

ⓘ TOP: Two different styles of DIY cable rounding.

TOP LEFT: Thar she blows!

Over the top: Constructing your own monster heatsink

In terms of personalising the cooling systems for your computer, one of the most extreme measures you can take is building your own CPU heatsink. Most machine shops worth their salt can source a chunk of copper, and then mill it for you into a massive heatsink. The biggest advantage of this method is that you can design one that will fit your chip, and you can also get it to wrap around the capacitors that generally sit around your CPU.

Use a plastic ruler to measure the dimensions of the heatsink off your motherboard (this will require taking it out of the case and placing it onto a flat surface). Make sure that you use a plastic ruler, as metal ones often become magnetised over time, and waving a magnet around computer components is not necessarily a good idea (though floppy disks are by far the most susceptible to electromagnetic radiation). It's a good idea to sketch out the dimensions onto a piece of paper, including plan and side views, so that the machinists will know what you are on about when you present it to them.

Make a few calls to local machine shops to source a piece of copper billet. You don't need much more than 300g worth of copper to start with (but keep in mind that a good deal of it will be shaved away by the machinists). Stress to the machine shop that the copper billet should be a cube (or as close to one as possible). And when you pop into the machine shop with your plans, tell them that you're trying to maximise the surface area to volume ratio, so that the lump of copper will act as a good thermal conductor. Most people who work with metal will know the basic properties and principles of thermal conduction, and if not, it's time to find a better machine shop!

Once the work on your heatsink is complete (it will take a week or so, depending on how busy the machinist is), grab a 12V fan (Dick Smith or Jaycar are good sources) and mount it to the top of the sink. The final step is to fashion an acceptable clip for the CPU slot. This we'll leave up to you, as what is required will vary widely based upon how you design your heatsink. The best bet, though, is to ask the machinist to make a thin steel strip (take in your old heatsink to use as a model) to use as a clasp.

Most importantly, ensure that your heatsink is not too heavy, or you stand a good chance of doing irreparable (and unwarrantable) damage to your motherboard. As a general rule, you shouldn't go over 250g for a heatsink, and this can get you a fair bit of copper, with a fan mounted on the top.

If you don't want to personalise your PC to this extreme, then turn to page 36 for our round-up of some other high-quality, commercially available heatsinks. A word of advice: don't forget to apply thermal grease to the bottom of your heatsink before you attach it to your CPU.

> 'There are many other things that you can do both to keep your PC running both cool and quiet, all of which can be done on a budget.'

winter, but the principle also works to greatly reduce the sound put out by your computer.

Cut a sheet of MDF to almost the same size as the removable wall of your case (you want it to be 1cm smaller on all sides than the side panel of your box). After you have a piece of MDF to use as an inner wall, drill holes in your case and sheet of MDF and slide bolts through the holes. The bolts need to be approximately 1.5-2cm in length. Fit a few washers to each bolt on the inside of the case before putting the MDF on. The washers act as spacers to keep the MDF off the metal wall of your PC (you only need 5mm space between each wall).

After you have installed all the spacers, slide the sheet of MDF over the top, and then hold it all in place by attaching the nuts to the end of the bolts. File off any extra bolt that protrudes over the end of the nut, and it doesn't hurt to put a dollop of silicon sealant over each nut to make sure that you aren't going to do any damage to delicate circuit boards if they happen to scrape against the nuts as you reattach the side panel of your computer.

But wait, there's more!

There are many other things that you can do to keep your PC running both cool and quiet, all of which can be done on a budget. We've attempted here to whet your appetite and get your brains firing in terms of coming up with some great ideas of your own.

Don't be afraid to get up to your elbows in pieces of hardware to hot-rod your own computer – after all, it's relatively inexpensive and it only requires some lateral thinking to get your machine running more efficiently. And don't forget to send us your own suggestions, or low-res images, of how you've souped up your machine.

No noise is good noise

In the early '90s it was common for computer desks to come with a separate compartment so you could keep your PC off the desk, giving you more space to spread out your work (or more mouse area). While these desks are becoming increasingly uncommon nowadays – PC cases have become larger and there are infinitely more wires protruding from the rear panel – they are still an excellent way of reducing the audible noise output of the fans and motors whirring away inside your box.

The final way you can cut down noise generated by your PC is to stick it in its own insulated box, as opposed to (or in conjunction with) insulating the inside of your existing box. It's relatively straightforward to construct external housing for your PC to reduce noise. All you need is a few materials that you can easily pick up at your local hardware store.

The best material to use for this is chipboard, for a few reasons. First, it is extremely dense, so it's good at stopping any noise passing through it. Second, it's quite cheap in comparison to other solid sheets of wood. It also comes in a variety of veneer finishes, from a wood-grain finish to a plain white melamine, which makes it easy to customise your box.

First, measure up the dimensions of the external overcoat for your PC case – this is done by measuring your existing box and adding 6cm to each side measurement for the chipboard box. The reason why you are cutting 6cm extra for each panel is to leave plenty of clearance on the inside of the box, so that air can flow happily around your PC when it is enclosed.

Next, measure the side panels as well as the top and bottom pieces, then cut them out of your sheet of chipboard using a handsaw (or power saw if you have access to one).

You won't need to cut the door to the front of the case just yet, as it is easier to mount the hinges and front door after you have built the box's side, top and bottom walls.

Once the side, top and bottom panels have been cut out of the melamine, line up the outside edge of the top and bottom plates with the walls. Drill holes in the walls about 5mm from the edges of the walls. This ensures that you can insert a screw through the side walls, and horizontally into the top and bottom plates.

After drilling the screw holes, run a strip of wood glue along the edge of the top and bottom plates, and screw the side walls to the edges of the plates (along the glue line). The idea is for most of the strength to come from the glue; the screws are just there for stability while the glue dries. The glue will take a few hours to dry, so we suggest you play a good session of Counter-Strike in the meantime.

After the glue has dried, you are ready to measure up the panel for the door. Using the ruler, measure the hole at the front of the case, and subtract 5-7mm from all measurements. This will enable the door to swing closed inside the mouth of the box.

Measure the holes for the hinges, and drill them before screwing the hinges into the chipboard on the inside of the box. Hold the door in place, and mark out the drill holes for the door once the hinges are attached to the inside of the box. This ensures that the door will fit in the right place without having to shave any extra wood off it.

If you measured accurately, the door will swing closed easily. Now you can attach a clasp to the front of your box if you want to; however, you'll probably run the computer with the door open a lot of the time, as it makes it easier to get to your drive bays.

Finally, slide the computer into its new home, and grab a cup of coffee to sip while marvelling your handiwork. You can also get iron-on edging strips for the exposed edges of cut chipboard. These will be available where you bought the chipboard, and are a cheap way to refine your craftsmanship. If you are concerned about the airflow to your PC it won't hurt to run the box with the front door open, although this will substantially reduce the silencing properties of your newly constructed insulation box.

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Spittin' chips

The two Mensa graduates responsible for this month's Letter of the Month and Forum Post of the Month both score a free set of rounded IDE cables, thanks to the generous people at PC Case Gear (www.pccasegear.com).

Letter of the Month: Eye candy overdose

To tell the truth, I'm sick and tired of eye candy, as in, too much of it. I'm also sick and tired of people who whinge about not having enough eye candy in a game. To them I say 'phooey'. Since when has a game been about the graphics? Look at Operation Flashpoint. Sure, the graphics aren't top notch, drooling-on-the-keyboard stuff. But really, it's more than adequate – enough to know what vehicle is what vehicle, what weapon is what weapon and to tell that the thing you're driving towards is a building or a tree.

Since when has a game not been about the gameplay? A person I spoke to recently said he didn't like Operation Flashpoint because of the way the engine looked, and the user interface.

Who cares if the graphics aren't top of the line? Isn't the major point of a game to have fun? For people who aren't willing to try a game such as Operation Flashpoint because they don't like how it looks, I feel pity. They are missing out on some great times playing it, making their own missions and playing it multiplayer (which completely rocks).

Don't judge a book by its cover, and don't judge a game by its graphics.
Cyph

Forum Post of the Month

'Are motherboards with integrated components worth buying?'
(www.atomicmpc.com.au/forum.asp?cat=bs&top=7612)
One of our favourite tech section regulars had this to say: 'Stay away from onboard video. If you want to run 3D games they are useless. If you want decent video you'll have to install another card at some stage down the track. Some systems also share your main memory for the video memory. This means that you're losing valuable system memory (if you have 64MB of SDRAM, usually 16MB will be used for the onboard video, which will leave 48MB of SDRAM for Windows and applications). Also, you'll be relying on the chipset or motherboard manufacturer to update the drivers, which means they'll be a couple of versions behind most of the time.

Onboard sound is better, but usually doesn't offer two-channel surround sound for games (for front and back speakers). Also, don't ever expect to be able to record external audio at any great quality as the signal output and input is noisy due to the D-to-A converters being shonky, which results in a lot of noise.

Onboard chips are only any good if you are building corporate machines or a system for your parents to surf the Internet with. It's a cheap way of building a system, but the components (especially video cards) are usually two years behind the current technology. They are more reliable as they have less components, and in most cases you can go out and buy another card to replace the onboard devices if they fail.'
acraik

Captain Attitude?

It seems Captain Atomic doesn't like me. I looked at him in issue six and he gave me the finger – what did I do? I called him only last week and he said he was coming over for a LAN, but he never turned up. He said he was 'too busy saving the world and saving atomic readers from the fearsome Blue Screen of Death', but I don't know. He still has his Cosmic Atomic Mobile switched off. If you see him please tell him that he owes me a game and that it's his turn to buy the bucket of KFC.
Fraggs

The tall poppy syndrome

The other day I realised, through my experiences in the IT world and the real world, our hate for power. The majority of people dislike Microsoft, many of them passionately. Now we are even beginning to see that attitude towards Intel to a degree. The list goes on and on: Bill Gates (who can like him?), Americans, police, John Howard, Telstra . . .

Although a lot of them are hated for their misuse of power (like Telstra), some of them we merely hate because of the power they hold (just like the popular kid in school who we all secretly hate because he gets all the chicks). I may be wrong, but let's just see what happens to the opinion of video chipset king NVIDIA over the next few years.
Dibble

BIOS bashing

My computer is back online and the first email I am sending is to all the great guys at atomic. Why was my machine offline? Let me tell you . . .

I was having lots of fun tweaking my BIOS, running through each step from your article in issue four, and was happy with the results.

At the end of the article was a small note on how fun it is to flash your BIOS. Not one to back down from a challenge, I promptly downloaded the appropriate files for my ASUS P3V4X motherboard. Let me tell you people, it ain't any fun at all. After receiving an error message during the EEPROM write, I was about to reload the BIOS backup I had made when another message popped up saying the BIOS had been flashed successfully and that I should now reboot. Hmm . . .

I trusted the message and was greeted with 19in of blackness – excellent! Just what I had hoped for! After lots of telephone shopping (you see, some retailers didn't know what a BIOS was) I found a very small computer shop that could fix the problem for me in one day. Secretly, I was hoping he couldn't fix it, because I really wanted to buy the ASUS CUSL2-C that was reviewed in issue five, but I needed to justify the money somehow.

'I was hoping he couldn't fix it, because I really wanted to buy the ASUS CUSL2-C that was reviewed in issue five.'

What have I learnt from this experience?

1. Computers tell fibs – it doesn't matter what you spent on the hardware.
2. Flashing is not fun. Leave it alone.
3. When your flatmates laugh and point at you, the only revenge possible is to pull the BIOS off the motherboard and leave it with the sharp side up on the toilet seat.

Paul

PS: Love the mag, especially the monthly blurb from Daniel Rutter (AKA the Chad).

The missing link

It's a sad tale. You finally managed to get a Kiwi hooked on something across the ditch. Then, when the sun was shining and all was well, your publishing/distribution people decided to deprive me of issue 5 of your excellent magazine.

The reason given: so New Zealanders would be up to date with our cousins across the way. Having baited me with issues 1, 2, 3, 4 and then 6, I find this depressing, soul destroying and mostly baffling. Have you guys concocted a secret that you don't wish to share? Is this some plot to torment us (before the coming test match), I wonder?

In a state akin to a stunned mullet.

Peter Southam

Hi Peter, we bundled 1 and 2, then 3 and 4 together for NZ so you could play catchups, but then 6 was out and 5 was out of date, so we shipped 6 to bring NZ up to date, leaving 5 behind. You need atomic 5, plain and simple. So, all existing NZ subscribers will be sent a free atomic 5. Hopefully you'll have it by the time you read this. Don't panic if you haven't – give it a couple of weeks. We're sorting shipping as this is being written.

Plus! All new NZ subscribers will be sent a free atomic 5. This magnificent freebie runs out after atomic 11 goes on sale (21 November 2001), but atomic 5 will still be available as a back issue to order. Bloody good, eh?

A happy fan

I would like to say grateful thanks for the PS/2 that I recently won. I will enjoy countless hours of fun!

Your magazine has gone from strength to strength. Unlike other magazines that just show the 'latest and greatest', atomic goes further to push the boundaries of what most computer users currently have by adding to them or tweaking, and this will always be very important in the minds of most people.

This also shows maturity in your mag's knowledge and content. Atomic's articles, commentaries and reviews are very reflective of the computer community. This is easily seen as supported by your forums and online questionnaires.

As a newbie on your forum I regularly dive in to get a quick answer, and this has helped me immensely in building my own PC. As your editorial says, I do hope to make it to hero status one day.

You will be happy to know that your magazine is well received not only in the home/leisure industry, but in the business/corporate arena as well. It is a common sight at our workplace to see a group of people gather round to chat about the newest issue of atomic.

You have created an atomic community, and this shows in your magazine. I am sure this extreme magazine will go a long way.

Glenn Macabenta

(Look out for 'Macawin' in the atomic forums.)

Keeping the beat

I was reading your article on plugging your ports. In step 2, regarding ZoneAlarm, you advised that the heartbeat used by Telstra BigPond Advance (BPA) is blocked when the Internet security setting is at high, and advised your readers to change the setting to medium. To keep your setting at high and still allow the BPA heartbeat to access its port, in the Security Settings window click Advanced, and a Local Zone Properties window will be displayed.

This window will allow you to add computers to your local zone. Click Add -> Host/Site, and an Add Host/Site window will appear. In the description box type 'BPA Heartbeat', or whatever you want, and in the Host/Site box type 'dce-server'. This will be resolved into the IP address used by the heartbeat (61.9.128.13 in my case). Then click Finish. This will allow the heartbeat to access to its port. I have been using ZoneAlarm on my BPA connection for quite some time now without a hitch.

D. Milne

Send your questions to post@atomicmpc.com.au or by post to:

atomic
Letters
PO Box 275,
Beaconsfield
NSW 2014

FREE STUFF IS GOOD STUFF

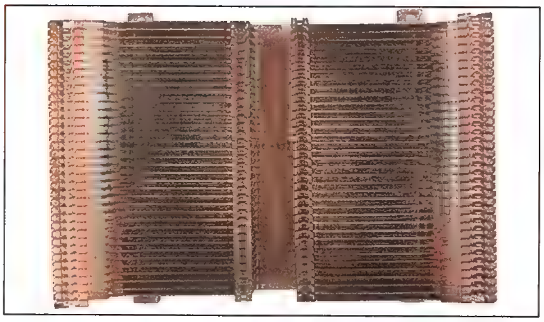
Ask yourself: 'Do I feel lucky today, punk?' Well, do you? If you answered yes, then this is your lucky page. This month we're giving away six super-sexy Summoner posters signed by the artist who created them, as well as five copies of the latest album from Gorillaz. One lucky reader also has the chance to win the ThermalRight SK6 all-copper heatsink.

Monkey Business

Last month we gave the new Gorillaz album, *Gorillaz*, a special spot in our What's Hot column. This gem of an album has had the atomic staff stomping around the office for the better part of the last month. Before we could say 'Damn those beats are some straight up, tripped out shit', EMI had kindly donated five copies of the CD to atomic. Note to Blink 182's publisher: we love the Blink! That's a hint in case you hadn't noticed. Seeing as we already had a copy, we've got all five copies to give away. You should know the drill by now . . .

Q. What is the name of the bar on Melee Island in the game The Secret of Monkey Island?

The Great Copper Giveaway



Read our HSF round-up and you'll know that the SK6 all-copper beast is the one to beat. This chunk of copper-cooled bliss will cool your CPU like no other, and proved to be the number one cooler of all those we tested. Thanks to the chilly people out at Below Zero (www.below-0.com), we've got one of these pricey doorstoppers to give away. At over one hundred green ones, this is no ordinary heatsink. The nugget of wisdom you'll need to know to win this beast?

Q. At what temperature does copper liquefy?

You Have Been Summoned

Thanks to the divine Estelle over at THQ, we've got six Summoner cardboard posters signed by the artist who created them to give away. These beauties are bound to appreciate in value faster than a gold-plated Porsche. For a chance to have one of these stunning pictures adorning a wall in your PC den, simply answer the following question correctly:

Q. When King Arthur and his knights entered the Enchanted Forest, they encountered a beast with the howl of a lion, goat and serpent combined. What is the name of this beast?

Issue 7 Pentium 4 winner: The lucky winner of the Pentium 4 CPU, motherboard, case and 128MB of RD-RAM is R. Porter from Dianella, WA. Lucky son of a . . .
Issue 6 Panasonic e-wear MP3 player subscription winner: N. Sorensen, Sunbury, Vic.

Please email entries to win@atomicmpc.com.au or post them to atomic, Competition Name, PO Box 275, Beaconsfield NSW 2014. Closing date for entries is 18 September 2001. Winners will be announced in atomic 10.

Terms and Conditions of Entry. 1. The promoter is AJB Publishing Pty Ltd (ACN 083 063 914) of Unit 3/5 44-70 Rosehill Street, Redfern NSW 2016. Promotion period is from 9.00am on 15/08/01 until 12.00pm on 19/09/01. 2. Entry is open to residents of Australia and New Zealand. Management and employees of AJB Publishing Pty Ltd and their immediate families, and any advertising, marketing or promotional firms associated with this promotion are not eligible to enter. 3. Enter by posting or emailing forms to AJB Publishing Pty Ltd. 4. The draw will be held at the offices of AJB Publishing Pty Ltd at 5.00pm on 19/09/01. Winners will be notified by mail and published in atomic 10. The prizes are not transferable or exchangeable and cannot be taken as cash. 6. The judge's decision is final and no correspondence will be entered into. 7. The promoter reserves the right to publish the winner's name and suburb for promotional purposes. 8. All entries will become the property of AJB Publishing Pty Ltd.

atomic warehouse

The goods stashed in the atomic Warehouse represent quality, no doubt there. Quantity though, is what's really in abundance. There's everything here. Everything computery, at least. We bundled all these informative, encyclopaedic adverts in one bunch up the back, so you, with but a quick flick of the wrist, can come out on top. The Warehouse is also sort of like a microcosm of hardware prices, in a stock market kind of way. Keep track of the unbelievable depreciation rate of your current rig, while planning your next system – whether it be an upgrade or all-new system. Let's just say that again because it feels good, everyone at home shout it out with me now, ready, go: "A whole new system!" Felt good huh?! Here's where you can turn the magic into reality.

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Systems - Call us for custom configurations

Our systems turn good games into great games.
It turns great games into an experience.

Bad games still suck,
but it makes them suck at 200 frames per second.

Vitesse Z

Specifications

Abit KT7A VIA KT133A Motherboard
Thermosonic ThermoEngine
256MB PC133 SDRAM
30GB 7200rpm ATA100 HDD
Samsung 32X/12R/8RW CDRW
Soundblaster Live!
Creative FPS1500 4.1 Speakers
Netcomm 56K Fax/Modem
Inwin 506 Midi-tower
Mitsubishi 104Key KB
Microsoft Wheelmouse Optical
Microsoft Windows ME
1 Year Onsite Warranty*

Step 1. How fast do you want to go

AMD Duron 850MHz	$1654
AMD Athlon 1GHz DDR	$1750
AMD Athlon 1.2GHz DDR	$1799
AMD Athlon 1.33GHz DDR	$1888
AMD Athlon 1.4GHz DDR	$1969

Step 2. Choose your video card

	$170
Prolink 64MB GeForce2 MX200	$151
Hercules 64MB 3D Prophet 4500	$290
Gainward 64MB GeForce2 Pro	$408
Asus 32Mb GeForce2 Deluxe	$418
Prolink 64MB GeForce3	$819
Hercules 64MB GeForce3	$933

Step 3. Choose your monitor

Hitachi CM625 17" Monitor (Flat)	$542
Hitachi CM772 19" Monitor (Flat)	$904
Hitachi CML150XW 15" TFT	$1,114
Hitachi CML17XE 17" TFT	$2,327
Philips 107E21 17" Monitor	$361
Philips 107P10 17" Monitor (Flat)	$581
Philips 109P20 19" Monitor (Flat)	$1,094
Philips 201P10 21" Monitor (Flat)	$2,029
Samsung 753DF 17" Monitor (Flat)	$473
Sony CPD-E220 17" Monitor	$618
Sony CPD-G420 19" Monitor	$1,230
Sony CPD-G520 21" Monitor	$2,054

Vitesse DDR

Specifications

Epox 8K7A+ AMD 761 Motherboard
Thermosonic ThermoEngine
256MB PC2100 DDR SDRAM
2x 20GB 7200rpm ATA100 HDD
Samsung 32X/12R/8RW CDRW
Hercules GameTheatre XP
Creative FPS1500 4.1 Speakers
Netcomm 56K Fax/Modem
Inwin 508 Midi-tower (300W PSU)
Microsoft Internet KB
Microsoft Wheelmouse Optical
Microsoft Windows ME
1 Year Onsite Warranty*

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AMD Duron 850MHz	$2175
AMD Athlon 1GHz DDR	$2276
AMD Athlon 1.2GHz DDR	$2321
AMD Athlon 1.33GHz DDR	$2410
AMD Athlon 1.4GHz DDR	$2479

Step 2. Choose your video card

	$170
Prolink 64MB GeForce2 MX200	$151
Hercules 64MB 3D Prophet 4500	$290
Gainward 64MB GeForce2 Pro	$408
Prolink 64MB GeForce3	$819
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Mitsubishi DV19NF 19" Monitor (Flat)	$986
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Sony CPD-G420 19" Monitor	$1,230
Sony CPD-G520 21" Monitor	$2,054

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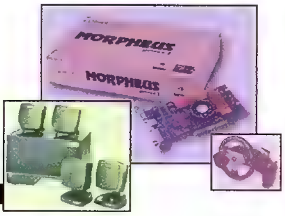

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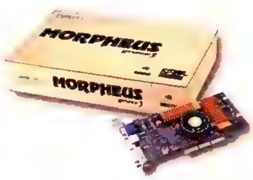

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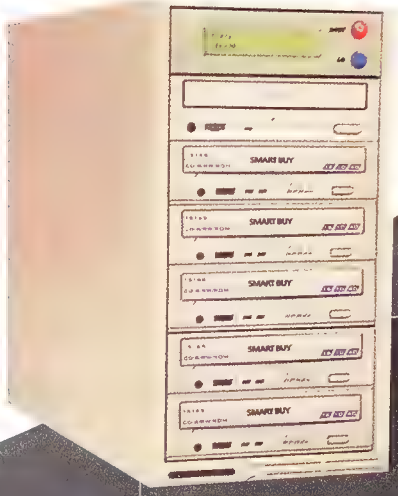

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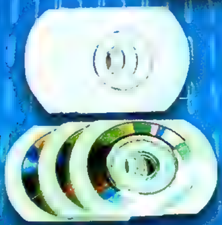

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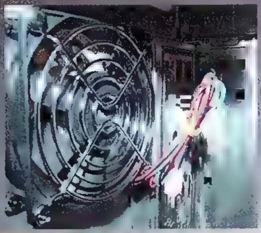
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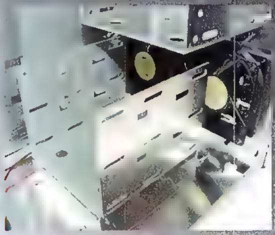
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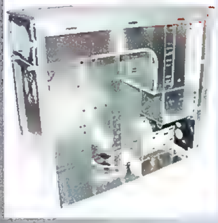

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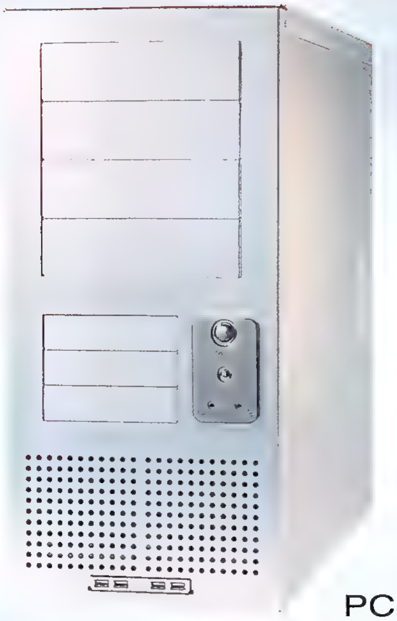
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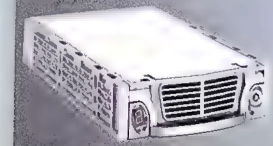
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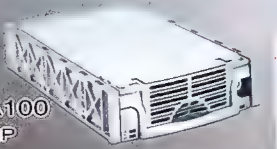
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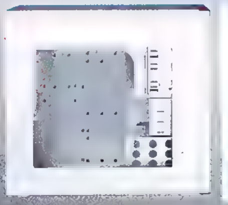
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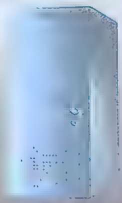
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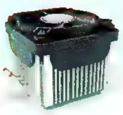

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The death of an Athlon

Athlon-B 1GHz 100MHz FSB

Passed away on the morning of July 30th, in a hail of burnt silicon. The Athlon is survived by its motherboard, the A7V133, and estranged evil twin, a 1GHz Coppermine Pentium 3. The motherboard has requested no flowers be sent, rather donations can be sent to the 'buy a big comfy couch for the guys in the Atomic Labs' fund.

The Athlon first arrived on atomic shores in late 2000. A hardworking, honest labourer its first task was to unveil the magical powers of the GeForce2 Ultra. Since those humble beginnings it helped in our efforts to debunk the DDR myths and showed us the future of 3D hardware with the GeForce3, the rise of the KYRO II and every other new video card to emerge throughout atomic's history.

Despite the emergence of newer, faster Athlons with more attractive overclocking potential, this humble Athlon kept on proving its worth by working tirelessly and selflessly day in and day out.

The precious memories are many, powering our very first glimpse at the power of the GeForce3's programmable Pixel and Vertex Shaders, providing comfort and warmth on many a late night of benchmarking and gleefully occupying the virgin sockets of many, many new motherboards.

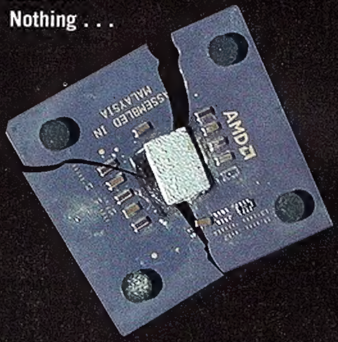
For its final, and fateful, task the Athlon volunteered for the ultimate torture test – to put its body on the line in order to discover the best heatsink. After a constant pounding by alternating lumps of copper and aluminium, its body was broken. But the spirit was still willing. Pushing into a final bench test it booted fine and started to work. Unfortunately, the load was too much, and the pervasive smell of silicon death filled the room.

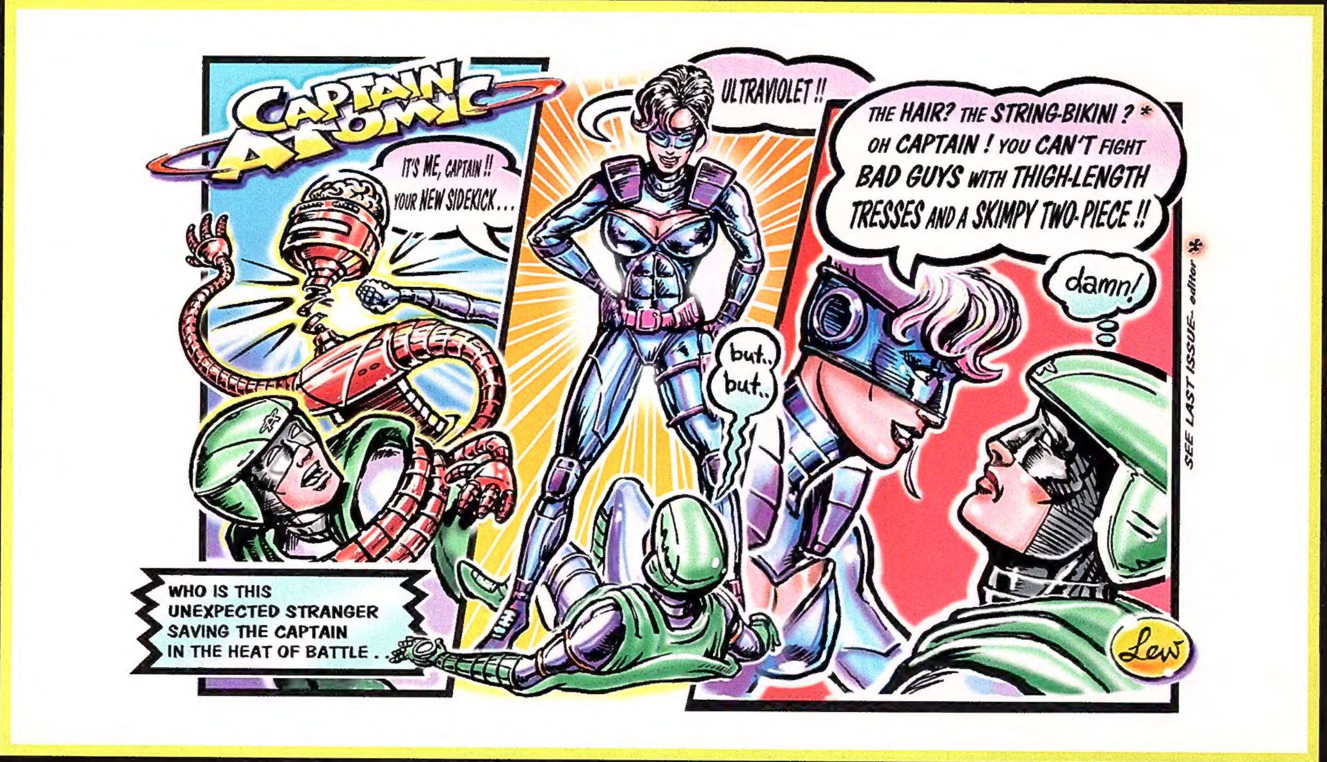
Resuscitation was attempted after a frantic period of deep thought. The A.H.E.M (Atomic Hardware Emergency Medics) resorted to some old techniques, carefully placing lips onto the core and blowing while the computer rebooted. Alas, this did not work (the medic is now happily recovering from third-degree lip burns), so some jumper leads were found and used to try to kick-start the clock. This resulted in a second crack of the CPU. The Athlon was declared absolutely stuffed at 9am.

Its life ceased, but it will continue to live on in the hearts and minds of atomic.

A thunderous bird of old,
100MHz pumped twice,
Increased tenfold,
A companion, a friend
Since atomic 1 you served,
Faithful and true,
You saw so much,
Bore the weight of benchmarks,
Showed us the light,
Helped in our search,
For the perfect frames.

Until that fateful day,
The weight of copper,
The looseness of clip,
A flash, a bang,
A puff of smoke,
A stench,
And then
Nothing . . .




CAPTAIN ATOMIC
IT'S ME, CAPTAIN !! YOUR NEW SIDEKICK...
ULTRAVIOLET !!
THE HAIR? THE STRING-BIKINI ? * OH CAPTAIN ! YOU CAN'T FIGHT BAD GUYS WITH THIGH-LENGTH TRESSES AND A SKIMPY TWO-PIECE !!
damn!
but.. but..
SEE LAST ISSUE- editor *
WHO IS THIS UNEXPECTED STRANGER SAVING THE CAPTAIN IN THE HEAT OF BATTLE . . .
Lew

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